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ABSTRACT

Of the various ways in which postsecondary education accommodates individual differences, this report is concerned with alternate treatments as opposed to postsecondary alternatives, institutional choice, program choice, elective options, and individualization. Chapter 2 explains how these alternate treatments are placed into four general classes: assignment, placement, selection, and exemption. These four are the subject of Chapters 3-6 respectively where they are defined more explicitly. Each of these strategies involves grouping students into alternate educational treatments on the basis of their cognitive characteristics. And in each case the objective is to enhance the specific instructional outcome (student achievement) or some broader educational benefit like improved retention or satisfaction. (Author/PG)

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Warren W. Willingham

College Placement and Exemption

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Preface

For several years in the early 1960s I was directly involved in institutional research. It was one of my responsibilities to carry out studies in order to advise the faculty on how to sort students into groups for more effective instruction and learning. Placement was the term usually applied to such sorting, though we recognized at the time that placement really involved several rather different problems, each characterized by somewhat different purposes and methods. After grappling with these problems for a while I formed the impression that one placement problem was more puzzling than the next and that there was exceptionally little useful discussion of such problems in the educational or psychometric literature. Perhaps this is why I always found "the placement problem" conceptually fascinating and, a decade later, readily accepted the College Board's invitation to undertake the work reported here.

The purpose was to do three things: (1) to develop a framework that would include the most important types of placement and exemption and closely related models and to help clarify the relationship among them, (2) to describe the educational rationale and technical characteristics of these models, and (3) to review fairly thoroughly the relevant research literature. The idea was to try to pull together and integrate what is known from a research standpoint. My chief aim was to encourage on individual campuses more systematic analysis of the objectives and outcomes of these various models of sorting students into alternate educational treatments.

While the intention was not to produce a "how to" handbook, I recognized that there were, in addition to researchers and directors of testing, many practitioners who might find this sort of analytic review useful if it could be written without assuming too much technical knowledge of measurement. These practitioners include college administrators and faculty who have some responsibility and perhaps a good deal of experience with placement and exemption programs but may have limited familiarity with experimental design or correlational analysis. Consequently, I have tried to avoid technical language and topics insofar as possible, but I have not hesitated to discuss important questions in some detail merely because they seem conceptually difficult.

Since this work is mainly concerned with the rationale and basic characteristics of the dozen models included, there are several important but secondary topics that are not covered here. I refer especially to various aspects of implementing placement and exemption programs on campuses. The role of the faculty needs careful attention so that such programs are properly integrated into the academic structure. Student participation in decisions regarding alternate treatments is a complex and critical issue dealt with only briefly here. Similarly, the whole matter of academic advising and providing students with adequate information for academic planning is obviously an important problem area that is exacerbated by increasing flexibility and multiple alternatives within an educational program. Though these matters are important, they lie beyond the scope of this book.

Others have made important contributions to this work for which I wish to express appreciation. Colleagues too numerous to mention have provided information about local programs and reacted to ideas with constructive and helpful advice. Richard R. Reilly and William H. Angoff read portions of the manuscript; Robert L. Linn and H. Paul Kelley read all of it. All made a number of useful suggestions for which I am grateful.

Jane Porter is largely responsible for the annotated bibliography, and she provided extremely valuable assistance throughout the work. Linda Cokos typed the various revisions with unusual patience and skill. These two provided the sort of help that makes writing a book a manageable task. I also want to thank Marcia Van Meter for her gracious and competent editing.

Finally, I express special gratitude to my family, who made the greatest contribution of all in their forbearance, dislocated schedules, and personal support.

Warren W. Willingham
October 1974

1

The Nature of the Problem

Since the late 1950s there have been several shifts in the way higher education deals with the problem of individual differences among students. During the post-Sputnik era, higher education was fascinated with the specially talented student and much attention was given to the identification, support, and enrichment of a relatively small proportion of the age group who showed marked academic promise, especially in scientific fields. The large bulge of high school graduates in the mid-sixties necessarily focused attention on selective admissions – one result of which was to enhance the stratification of institutions of higher education with respect to academic ability. Recovering from that surge, higher education then responded to new social priorities by placing great emphasis on access to higher education for all types of students, especially those previously underrepresented.

More recently it has become clear that access is not enough and that an equally critical problem is how to provide a useful education for students with very different needs and very different backgrounds – i.e., how to deal effectively with wide individual differences that result from free-access policies. From the standpoint of assessing individual differences, the emphasis has changed from identifying students to determining how to educate them. Turnbull (1974) has called it a shift from "which" to "how."

An important implication of this shift is the need for a better understanding of how students can be matched effectively with appropriate educational treatments. This is a large and complicated topic, and it is certainly not new. In this report the focus is on a special set of educational strategies, here called *alternate treatment models.* They emphasize especially such familiar topics as placement and exemption, but also include closely related methods of grouping students in order to enhance the benefit of instruction and education generally. The purpose here is to develop a framework for such topics, to describe a group of 12 specific models, to examine their educational rationale, to review the important literature on each, to examine how such models are used in practice, and of course to speculate on how their use might be improved.

Improving the means by which higher education accommodates individual differences is an old problem that has taken on a new urgency for several reasons. Each is well known and need only be mentioned briefly.

First, there is the great increase in diversity among college students. The development of free-access community colleges, the open admissions movement, federal student aid programs, the flexibility of nontraditional programs – all have encouraged much greater representation of those Cross (1971) calls "new students." These include especially adults, minority students, and students who are weak in traditional academic areas. This diversity enhances the individual differences that already characterized college students and makes more apparent the need to adapt education accordingly.

Second, accommodating education to individual differences has become a major reform movement, with several mainstreams and numerous eddies. A major theme in this movement has been to shape education to the needs and aspirations of individuals, to place high priority on student development. That priority has complemented the emphasis on improving the relevance of education – i.e., making education more meaningful to adult life and to the requirements of effective careers. In turn, the modes and conditions of instruction have been increasingly individualized in an effort to adjust the college to the student.

Third, colleges now have strong economic motives to respond to the interests and needs of students. As Glenny (1973) has documented with grim projections, higher education faces a long-term drought of students. Thus, adapting effectively to individual differences in student aspirations, needs, and styles may well be a prime requirement in the competition for students – competition among colleges but also between higher education and other alternatives such as proprietary institutions and work training programs.

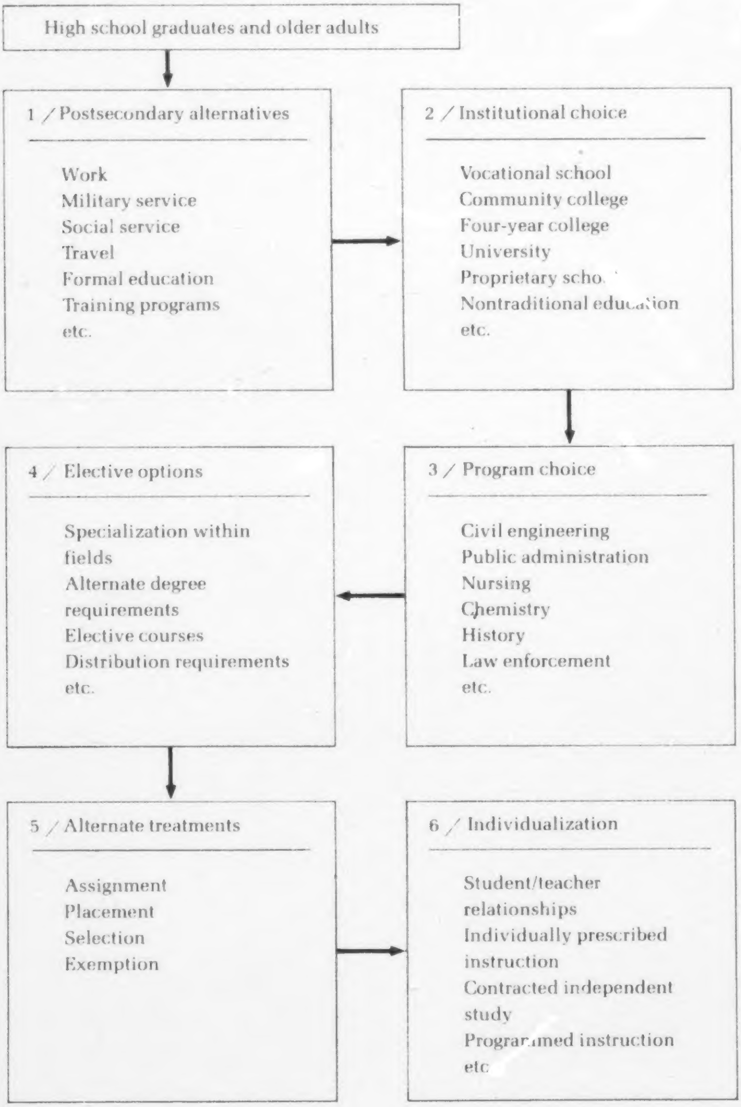
These considerations suggest that there are personal, societal, and institutional reasons why education is now even more concerned with accommodating individual differences than has always been the case. If one looks at the entire system of postsecondary education it is apparent that individual differences among students are accommodated in many ways. This report, however, is concerned with only a particular set of alternate treatment models. In order to set this discussion in the proper context, it is useful to look first at the overall picture.

HOW DIFFERENCES ARE ACCOMMODATED

Figure 1 shows six general ways in which postsecondary education accommodates individual differences: postsecondary alternatives, institutional choice, program choice, elective options, alternate treatments, and individualization. As the figure indicates, one can imagine an individual student moving from broad alternatives to progressively more specific choices and options that meet the individual's needs. That is an oversimplification, of course. A typical student would loop back and forth among the six steps illustrated, and several options might be exercised within each box. Furthermore, the boxes are not mutually independent; e.g., institutional choice may depend partly upon program choice. Recognizing those qualifications, the schema does provide a convenient means of limiting and describing the main concerns of the report.

1. *Postsecondary alternatives.* Many students are simply not interested in more schooling or cannot reap enough personal benefit to make it worthwhile. In recent years there has been much interest in expanding the alternatives to continuing formal education after secondary school and making them more attractive, but that initia-

FIGURE 1: Six ways postsecondary education accommodates individual differences


High school graduates and older adults
1 / Postsecondary alternatives
Work
Military service
Social service
Travel
Formal education
Training programs
etc.
2 / Institutional choice
Vocational school
Community college
Four-year college
University
Proprietary school
Nontraditional education
etc.
3 / Program choice
Civil engineering
Public administration
Nursing
Chemistry
History
Law enforcement
etc.
4 / Elective options
Specialization within fields
Alternate degree requirements
Elective courses
Distribution requirements
etc.
5 / Alternate treatments
Assignment
Placement
Selection
Exemption
6 / Individualization
Student/teacher relationships
Individually prescribed instruction
Contracted independent study
Programmed instruction
etc.

tive lost some adherents with the leveling off in college enrollments.

2. *Institutional choice.* When students do pursue formal training after secondary school, there are several rather different educational contexts for doing so. Vocationally oriented institutions offer a genuine alternative to conventional colleges; external degrees and other nontraditional forms are explicitly intended to meet individual needs not otherwise accommodated. Colleges do differ in prestige and specific strengths, but the basic curriculum and academic procedures of most institutions within each of the categories listed in box 2 in Figure 1 are probably more similar than most lay observers imagine. What differences in style or intellectual climate there are among institutions are still laden with ambiguity and difficult for applicants to discern.

3. *Program choice.* The choice of a degree program or career line is a major way in which postsecondary education accommodates differences among students, particularly with respect to their interests and aspirations. This set of alternatives is connected with career guidance at one end and problems of manpower utilization at the other. Both are important, though neither is directly connected with the substance of this report.

4. *Elective options.* As a student pursues a particular degree program, there are numerous opportunities for expressing individual interests. Some may be long-term interests like specialization on certain topics within a discipline. Most college curriculums now encourage students to be responsible for their education through quite flexible use of electives and substitute requirements. Some say the flexibility is too great. In any event, the effect is to accommodate individual differences in educational preferences.

5. *Alternate treatments.* There are numerous instances in which students are grouped in one learning situation or another in order to enhance their learning by taking into account individual differences in preparation, ability, or other personal characteristics. In general, the strategy is to maximize educational benefit by providing alternate treatments that are tuned to cognitive differences among students. This report is concerned with four general classes of such alternate treatments: assignment, placement, selection, and exemption. These in turn include 12 specific models, each of which is described in detail.

6. *Individualization.* Each of the previous five mechanisms is a

structured, programmatic way in which higher education accommodates individual differences. At a different level of specificity, colleges also meet needs of individual students on a one-to-one basis. Traditionally students have received such individual attention in their relationships with teachers. Newer instructional modes now often utilize technology in an effort to provide individually tailored instruction without the prohibitive expense of individual tutoring. As the term is used formally, individualization refers to systematic instructional techniques that bear a close relationship to the alternate treatment models discussed in subsequent chapters. Informally, individualization has come to mean almost anything an institution does to pay more attention to the characteristics, goals, and interests of individual students.

SCOPE OF THIS REPORT

Of these various ways in which postsecondary education accommodates individual differences, this report is concerned only with the fifth—alternate treatments. Chapter 2 explains how these alternate treatments are here classified into four general classes: assignment, placement, selection, and exemption. These four are the subject of Chapters 3 through 6 respectively where they are defined more explicitly. They involve the following types of alternate treatments:

Assignment of students with different aptitude or background characteristics to learning situations that differ in some important respect but have identical subject-matter objectives; e.g., attempting to match different students with different teaching methods so that all learn better. Chapter 3 describes two assignment models.

Placement of students at different levels of a course sequence depending upon how well the student knows the subject; e.g., allowing a student to skip the first course in French. Chapter 4 describes three placement models.

Selection of students with different aptitude or background characteristics to learning situations that do not have the same subject-matter objectives; e.g., selecting outstanding students for an especially difficult elective course. Chapter 5 describes three selection models.

Exemption of students from learning experiences depending upon subject-matter competence; e.g., the student is or is not required to satisfy a distribution requirement depending upon how much he already knows in that general area. Chapter 6 describes four exemption models.

Each of these strategies involves grouping students into alternate educational treatments on the basis of their cognitive characteristics. And in each case the objective is to enhance the specific instructional outcome (student achievement) or some broader educational benefit like improved retention or satisfaction. As Figure 1 and the foregoing definitions make explicit, this report is not concerned with such matters as career choice or choice of electives, important as they may be in helping to mold education to the needs of individual students. It should also be clear that it is not the object of this report to deal with innovation or reform as a means of adapting higher education to individual differences among students. Some of the topics covered here are relatively new, but innovation has no substantive referent—it applies no more to alternate treatments than to any of the other adaptive mechanisms shown in Figure 1.

And although this report is not concerned specifically with individualization, that topic appears frequently throughout these pages, for the reason that individualization and alternate treatments bear an intimate relationship. The use of alternate educational treatments involves the development of effective decision rules for putting students into one group or another—in a sense, a form of individualization. While individual treatment of individual students is a theoretical ideal, dealing with students in various groupings is often desirable for pedagogical reasons and often necessary for economic or practical considerations. This report emphasizes alternate treatment of groups rather than one-to-one individualization, but there is frequently no easy distinction between the two. This is a complicated topic that will come up later in the report.

Readers who are not technically inclined may be tempted to skip over Chapter 2. However, the first pages of that chapter provide a basic rationale for much that follows, plus definitions for assignment, placement, selection, and exemption and the 12 models they include. Chapters 3 through 6 contain the detailed substance of primary interest. Each is self-sufficient and can be read alone, though placement and exemption are closely related and read better in that order. Each of these main chapters includes some historical perspective and discussion of particular issues that are especially pertinent, but the reader will recognize that some of these issues have an important bearing at more than one point in the text. For example, the history of research on ability grouping is discussed in Chapter 3 on assignment, but it bears on selection as well. And articulation is discussed in Chapter 6 on exemption but is almost as important in relation to placement.

A final word concerning terms and definitions. This report is called *College Placement and Exemption* because that title seems to come closest to conveying its primary emphasis. Placement and exemption likely have a broader, certainly a less specific, meaning in most people's minds than they do in this volume. In an effort to reduce ambiguity, these and similar terms that appear here frequently are consistently used with a particular meaning. Such terms are defined as they are introduced.

2

A Framework of Models and Methods

As noted in the introduction to this review, there are many different ways in which a college can create alternate treatments in its educational program to fit the individual characteristics of students. There are also a variety of technical problems concerning identification of students, evaluating outcomes, and so on. The problem is how to make sense of it all. It would be useful to have a general theory that would delineate the educational problems and define the technical parameters that determine their character. The current state of the field suggests that such a hope is premature. Nonetheless, it is desirable to work toward a more useful framework than now exists.

For this purpose decision theory seems to provide the best general orientation and point of departure. As will become obvious there are severe restrictions in the extent to which classical decision theory can be applied to practical educational problems, but the approach has important heuristic values that far outweigh its abstractions. In particular, decision theory does suggest a general framework for considering problems of alternate educational treatments; and it does focus attention on the technical questions that have to be dealt with. These are the two issues of special concern in the following discussion.

DECISION THEORY

Decision theory developed largely within mathematical statistics some 25 to 30 years ago. It is mainly concerned with estimating the benefit or utility that can be expected from alternate courses of action. There are many situations in which such decisions are clouded by random events or complex uncertainties. Decision theory was applied early in economics; another pioneering application was the problem of quality control in industrial operations. In recent years there have been numerous practical applications and related theoretical development in operations research and Bayesian statistics. Cronbach and Gleser (1965) summarize this work briefly and provide useful references to this field at various levels of mathematical elegance.

The application of decision theory to problems of alternate educational treatment is attributed principally to Cronbach. In his presidential address to the American Psychological Association, Cronbach (1957) distinguished "two historic streams of method, thought, and affiliation" in scientific psychology: experimental and correlational. In the experimental study of behavior, individual differences merely interfere with the discovery of universal treatment effects. In the correlational analysis of individual differences, variations among treatments simply amount to error. Cronbach made the telling point that neither approach is adequate by itself. Both methods are necessary because some types of individuals respond to one treatment while other types respond to another treatment.

The implications of this generalization for the use of tests in educational placement and selection were spelled out in some detail in a book by Cronbach and Gleser (1957). This work was quickly recognized as a classic, and a second edition with supplementary material was published in 1965. Because of theoretical limitations discussed later in this report, and possibly because it was highly technical, this application of decision theory has been a standard reference in graduate seminars but has had little discernible effect on practices in higher education. It was not until 14 years later that Hills (1971) made the only serious attempt to discuss college placement in the context of decision theory—and that discussion was designed for measurement specialists (see Webb 1967 for a brief exception). So it is in this context that the usefulness of decision theory in understanding practical educational problems must be considered.

AN ILLUSTRATION

There are several critical ideas in applying the notion of decision theory to such educational procedures as remediation, course exemption, sectioning, honors programs, etc. First, it must be recognized that these procedures always represent alternate treatments. If a student is not included in a particular treatment under study, he follows some other course—either another special treatment or the "regular" treatment. In any event, evaluation of the usefulness of an educational program always involves a comparison between alternate treatments.

Second, the fact that a special treatment (program) is intended only for some proportion of all students implies that it is effective primarily for those students while some other treatment is more effective for the rest. Thus, there is an interaction implied between the type of treatment and the type of student.

Third, all consequences of allocating students to alternate treatments must be considered. These include costs and side effects on the institution as well as on student learning. Thus, treatments will likely have multiple outcomes with positive or negative utility to be considered.

Fourth, the outcome of individual decisions is indeterminate at the time decisions are made. Consequently, decision theory is a strategy intended to maximize the average gain across all students.

To illustrate a form of alternate treatment from the standpoint of decision theory, assume that the first mathematics course ordinarily taken by engineering students at a particular university is calculus. The faculty's experience indicates, however, that some incoming students are insufficiently prepared and need a precalculus course covering certain critical topics. So treatment A would consist of a two-course sequence—precalculus followed by calculus. Treatment B would consist of calculus alone. The most relevant measure for sorting students into these treatments would be a mathematics test covering the critical topics. The appropriate criterion against which to evaluate effectiveness of the two treatments would be achievement in calculus at the end of the sequence for both groups. Such an evaluation involves examining the regression line for each treatment; i.e., the way calculus achievement increases with score on the mathematics placement test for each treatment group separately. Figures 2, 3, and 4 illustrate what might happen.

FIGURE 2: Illustration of no interaction between trait and treatment

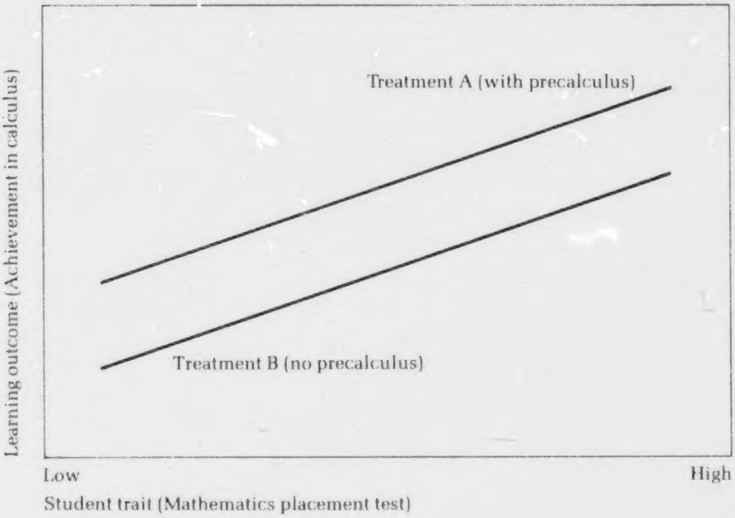


Figure 2 indicates one possible outcome of randomly placing a sample of students in the two treatments. The regression lines shown in the figure are parallel. Students who were high as well as students who were low on the mathematics placement test seemed to profit somewhat from the precalculus course, and all who had the extra preparation (i.e., took treatment A) achieved at a higher level in the calculus course. The difference may or may not be reliable and may or may not be practically significant, but the outcome shown in Figure 2 indicates that the placement test has no value for placing some students in treatment A and others in treatment B. No differential placement is indicated because achievement is always higher in treatment A regardless of where the student stands on the placement test. It is simply a matter of deciding which treatment is better for all students, considering cost, time, and other factors.

FIGURE 3: Illustration of crossing interaction between trait and treatment

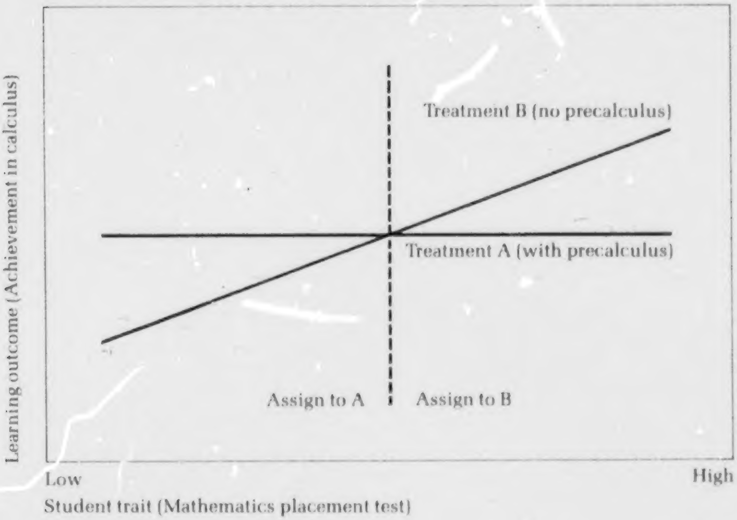


Figure 3 shows another possible outcome. The two regression lines have different slopes and intersect at a point within the range of placement test scores. This outcome suggests that students who score high on the placement test do better in calculus when placed in treatment B and those who score low do better if placed in treatment A. This is called a trait-treatment interaction (TTI or, by some writers, ATI for aptitude-treatment interaction). The point of intersection provides a decision rule for placing students in one treatment or the other. Greatest benefit accrues when students to the left of the dotted line are placed in precalculus and those to the right are placed directly in calculus.

FIGURE 4: Illustration of noncrossing interaction between trait and treatment

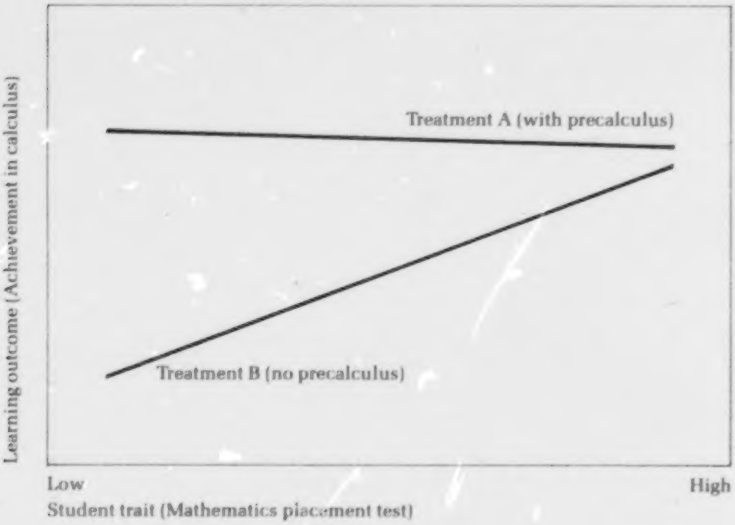


Figure 4 shows another possible outcome in which the two regression lines have different slopes but do not cross within the score range of the placement test. Superficially, treatment A may appear generally superior since maximum learning takes place when all students take the precalculus course. But these figures take into account only learning outcomes. To represent adequately the net utility of each treatment, one would have to discount somewhat the expected benefit of treatment A to account for its greater cost. That result would suggest that only a portion of the students should take the precalculus course. For students who make a high placement test score, the slight advantage of taking precalculus simply would not be worth the extra time and cost.

Snow (1972) has pointed out that outcomes of this sort have interesting implications with respect to the experimental and correlational methods of studying educational treatments. An experimentalist looking for the best instructional method would examine only average outcome when comparing treatments and conclude incorrectly that there was no important treatment difference in the data of Figure 3. The same sort of comparison in Figure 4 would suggest incorrectly that treatment A was significantly better for everyone. An experimental comparison would only be accurate in the case of Figure 2, but a traditional correlational approach here would have indicated that the mathematics test had good predictive validity and would suggest incorrectly that the test is useful for placement. The overall correlation for either Figure 3 or Figure 4 would be fairly small and might suggest that the test had little predictive value – another false conclusion.

There is one principal conclusion and striking implication of this approach to evaluating alternate educational treatments. That is the fact that trait-treatment interactions represent the key to successful adaptation to individual differences. This has been said in different ways by different investigators prominent in this field. "All attempts at adaptation or individualization of education rest implicitly or explicitly on [TTI] hypotheses" (Snow 1972). "For placement tests to be worthwhile, the placement test must have different regression slopes for the various treatments" (Hills 1971). "A 'validity coefficient' indicating that test X predicts success within a treatment tells nothing about its usefulness for placement" (Cronbach 1971). "As awareness of the requirements for the placement and classification use of tests in education increases, a different criterion will be applied to tests for these purposes – the criterion of differential validity" (Thorndike 1971).

Aside from this important conclusion it will be obvious from subsequent discussion that a wide variety of useful implications can be generated by the approach outlined, though many applications are technical and highly specialized. There are, for example, a number of topics discussed by Cronbach and Gleser (1965) that fall beyond the scope of this review. These include sequential decisions, the "bandwidth-fidelity dilemma," and the problem of multiple treatments.

In general, decision theory is mathematical and abstract. There are several good reasons why it is not readily applicable on any one-to-one basis to practical problems of designing educational treatments or programs. It is useful to mention these considerations because they help to clarify the strengths and weaknesses of the approach. A major problem that some have called the Achilles heel of decision theory is the fact that dollar costs and learning outcomes cannot be expressed on the same scale. As a consequence, determination of the overall utility of alternate treatments must necessarily remain a subjective weighing of values. A similar but more specialized problem is the fuzzy relationship between utility and the grade scale. One might well argue that, as a measure of utility, the familar 0 to 4 grade scale should make a greater distinction between passing and failing grades because in the latter case the course must be repeated. Furthermore, in most types of alternate treatments there are myriad subtle values involved – values that bear on individuals or the institution. Typically such subjective considerations belie any possibility of strict application of mathematically derived decision rules for allotting students to the best educational treatment. The complexity of the decisions even gives rise to an urge to ignore important aspects of the problem. As Cronbach and Gleser (1965) put it: "There is a paradox here. Decision theory is distinguished from simpler models by the fact that it is built of concepts that are often neglected: the set of alternative treatments, the costs of experimentation, the possible outcomes and the payoffs associated with them, etc. Yet when one seeks to make use of decision theory, he almost invariably sets a number of these key concepts aside, so as to make the model tractable."

The trick, of course, is to incorporate those conceptual aspects of decision theory that can be helpful in reaching partly intuitive decisions – decisions that must include educational experience and a "feel" for the reality of the situation. In the context of this discussion, decision theory seems helpful in suggesting ways to look at (1) the variety of alternate treatment models, and (2) ways to approach the methodological problems involved. It is to these two sets of issues that the remainder of this chapter is directed.

TYPES OF ALTERNATE TREATMENTS

A variety of educational programs are designed as alternate treatment strategies to serve various purposes. Granting sophomore standing is very different from placing students in remedial reading which, in turn, is very different from deciding what French course is appropriate for a given freshman. Despite the obvious differences, each of these instances is a common form of alternate treatment, and they share certain important characteristics. In attempting to understand any class of events that comes in different types, a pertinent first question is what are those types and how are they organized? As it happens, the basic characteristics of the decision theory approach are useful in developing a framework of alternate treatment.

Referring to Figure 2, it is clear that there are three basic variables that characterize alternate treatment strategies. The first of these is the assessment variable used to sort students into one or another treatment (learning condition, course, program, etc.). The second is the criterion variable that serves as a common measure of outcome for alternate treatments. A third is the range of potential variations in the treatment itself. All three of these are represented in Table 1, and as indicated each of the first two types of variables can be subdivided at a critical point for the purposes of defining a useful framework.

First, there are two rather different types of assessment variables: one sorts students on knowledge of subject matter that is directly relevant to the alternate treatments under consideration; the other might be any aptitude or personal characteristic. When students are put into one course or another on the basis of an achievement test, there is or should be an intimate relationship between the content of the test and the content of the course. The decision strategy basically depends on recognizing what the student does or does not already know about the subject. On the other hand, when aptitude or some other personal characteristic is used to sort students into instructional alternatives, the basic strategy relies on some underlying assumption like the student's ability to handle the material.

Similarly, a quite important distinction must be made between two types of criteria. In order to evaluate rationally the outcome of alternate educational treatments, it is always necessary to have an outcome criterion that is common, or in some sense comparable for the two alternatives. The critical distinction lies in whether there is a common criterion of student achievement at the end of the alternate treatments. For example, when the alternate treatments consist of two courses with the same general objectives, a common examination provides outcome evidence that can be compared directly. But often alternate treatments involve sorting students into courses or programs with quite different objectives, in which case comparing achievement outcomes for the two courses is like the proverbial problem of comparing apples and oranges. In this case one must seek common criteria in more general considerations such as student satisfaction, persistence, institutional benefit, etc.

TABLE 1: Major classes of alternate treatments

		NATURE OF THE COMMON CRITERION	
		End of course achievement	Other educational outcomes (persistence, satisfaction, etc.)
TRAIT ASSESSMENT	Aptitude or personal characteristic	*ASSIGNMENT*	*SELECTION*
	Knowledge of subject matter	*PLACEMENT*	*EXEMPTION*

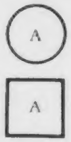
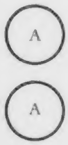
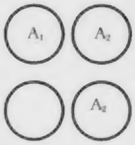
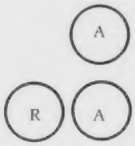
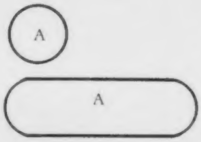
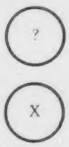
As Table 1 indicates, the joint action of these two types of criteria and two means of assessment creates four classes of alternate treatments: assignment, placement, selection, and exemption (these are defined in italics in the following four paragraphs). Within each of these general classes there tend to be characteristic ways that treatments vary, common purposes to be served by the alternate treatments, and similar procedures involved. Within each class it is useful to distinguish several models. Twelve such models are outlined in Table 2. It must be recognized, however, that these are merely prototypes and many variations occur in local situations. These four classes of alternate treatments are discussed in detail in Chapters 3 through 6. As will become obvious, the ideas and principles from decision theory apply most directly to assignment as described in Chapter 3 and become progressively more tenuous as applied to the models in Chapters 4 to 6.

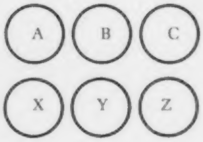
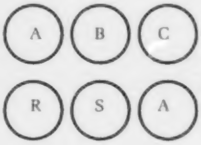
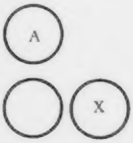
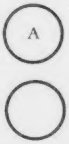
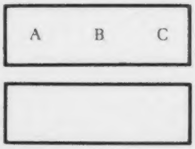
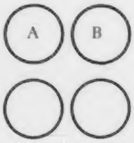
Assignment. *Grouping students of similar ability or personal characteristics into alternate educational treatments that have common subject-matter objectives.* In Models 1 and 2 the alternate treatments are distinguished by the manner in which the course is presented, and students are assigned to the alternatives according to personal traits that interact in a useful way with the mode of presentation. Thus, it is fairly simple to determine whether differential assignment results in superior overall student performance in the course (and this is usually the main criterion aside from cost). Treatments may vary in many different ways; they are classified here as variation in instructional methods and matching of students and teachers.

Placement. *Positioning students at the optimal point in an instructional sequence on the basis of how much the student knows about the subject.* In this context, placement corresponds fairly closely to conventional use of the term. Students are placed on the basis of subject-matter tests in alternate treatments that vary on the basis of subject-matter content. Treatments vary in length (e.g., a one-course sequence versus a two-course sequence), but they always have a common subject-matter criterion at the end of the sequence. The general purpose of placement is to match the content of instruction with what the student needs to learn next. Vertical sectioning (Model 3) and remediation (Model 4) are extremely common and come in many variations. It should also be noted that Models 3, 6, and 9 are often lumped into the same placement category though they differ in significant ways.

Selection. *Grouping students of different ability into alternate programs with different educational content.* Models 6, 7, and 8 represent the classical selection strategy applied to students after they have enrolled. That is, selection applies not only to admitting students to an institution but also admitting them to special courses

TABLE 2: Illustration of 12 alternate treatment models

	Model	Alternate treatments		Purpose of treatment variations
ASSIGNMENT	**1** Method variation		Regular course Alternate instructional method	To match learning conditions with student characteristics
	2 Matching students and teachers		Professor X Professor Y	To match teaching style with learning style
PLACEMENT	**3** Vertical sectioning		Regular sequence First course exempted	To start the student at an appropriate point in a sequence of courses
	4 Remediation		Regular course Regular course preceded by remediation	To teach the student specific content or skills required in higher courses
	5 Group pacing		Regular course Course length determined by rate of achievement	To match the rate of instruction with the student's rate of acquisition
SELECTION	**6** Selective sectioning		Whatever the student takes instead of Course X A course available only to qualified students	To offer an advanced or enriched course to those students able to profit from it

	Model		Alternate treatments	Purpose of treatment variations
SELECTION	**7** Honors programming		Regular courses Honors courses	To offer a challenging, integrated program to specially talented students
	8 Compensatory programming		Regular courses Remediation, basic skills and some regular coursework	To offer an integrated program for poorly prepared students
EXEMPTION	**9** Horizontal sectioning		Regular course Special course required of those exempted from regular course	To enrich the program of students who demonstrate competency in a required course
	10 Course exemption		Regular course No requirement or unspecified requirement	To recognize (through credit or waiver) knowledge acquired in a specific subject
	11 Advanced standing		General education requirements Requirements credited	To recognize (through credit or waiver) a given level of educational attainment
	12 Recognizing competence		Required competencies Competencies credited	To check off competencies previously acquired

or programs that differ from the regular curriculum. Students are selected according to their predicted ability to succeed, and there is no comparable achievement criterion for those who are and are not selected. Treatments are, therefore, evaluated according to nonachievement indicators of favorable outcome such as satisfaction, persistence, and success in subsequent work.

Exemption. *Excusing students from a degree requirement on the basis of demonstrated proficiency that may have been acquired under any auspices.* In exemption Models 9, 10, 11, and 12 a student may or may not receive credit; he may even be required to take a course in place of the one exempted. So the variations in treatments rest largely on administrative considerations. Similarly, exemption strategies are evaluated in large measure on the basis of administrative and general educational considerations such as fairness, curriculum articulation, social equity, institutional commitments, economics, and so on.

METHODS AND MEASURES

Assume one wishes to examine systematically some particular form of alternate treatment. There is a series of critical questions that ought to be considered. For example:

What is the nature of the proposed alternative treatments? In what essential ways do they differ?

What measures of outcome would be appropriate and comparable for the two treatments?

Why would beneficial outcome be greater for some types of individuals in one treatment as opposed to another?

What sort of assessment measure would identify such people? How should the measure be validated?

How many individuals should be identified to follow one treatment or the other?

On what basis is the usefulness of the entire procedure evaluated?

These questions obviously concern the methods and measures that are used in designing and evaluating a particular model of alternate treatments. The questions are interlocking, but they involve multiple decisions and multiple interpretations of what constitutes utility. Often certain methods or measures are preferable, but the special characteristics of a local situation or limitations in time or resources may argue for a less rigorous procedure. Such considerations are taken up in the discussion of alternate treatment models in following chapters. In this section the purpose is merely to provide a brief framework to clarify what methods and measures are part of the overall picture. This can be done most readily by brief discussion of five topics: (1) creating trait-treatment interactions, (2) types of assessment measures, (3) validating assessment measures, (4) determining cutting scores, and (5) evaluating outcomes.

CREATING TRAIT-TREATMENT INTERACTIONS

Following the logic of the decision model shown in Figure 3, it is apparent that the key to successful use of alternate treatments is the trait-treatment interaction. The central problem is how to construct an alternate treatment model so that useful interaction will be created. There can be no point in treating different students differently unless there is a resulting gain in utility. Even though it seems obvious that the interaction is necessary, various writers (e.g., Cronbach and Snow 1969; Hills 1971) have commented on the infrequency with which clear interactions have been demonstrated and the conceptual difficulty of imagining the right set of conditions that will produce interaction. A good part of this difficulty seems due to the lack of an adequate frame of reference for hypothesizing what sorts of treatments might work differentially. In a sense this whole report is directed toward such a frame of reference, but there are some heuristic approaches to the problem that can be mentioned briefly. The first four outlined below are essentially the same as those strategies suggested by either Salomon (1972) or Snow (1972).

Rational analysis. The decision theory model has three basic elements: the assessment variable, the outcome criterion, and the treatment. An obvious strategy is to concentrate on one of these and imagine what conditions would have to be met in the others in order to produce an interaction. For example, one might start with a pair of alternate treatments and list a number of student traits that might interact with those treatments. As a more familiar illustration, one might start with the special characteristics and educational needs of a particular group of students and ask what types of programs might be more effective for this group of students than for students in general.

Instructional accommodation. There are two ways to accommodate instruction to the strengths and weaknesses of individual students. One is to capitalize on learning preferences or special abilities of certain types of students. For example, students with a record of autonomous achievement might do better in independent study than would undergraduates in general. A complementary approach is to compensate for student weaknesses. For example, if a learning task involves complex rules, providing supplementary cues might help the student with poor memory but prove irrelevant or actually interfering to the student with good memory. It is important to note that this compensatory accommodation does not deal directly with the student's weakness (in this case, poor memory); it merely sets up the learning task to circumvent the weakness. In that sense it is distinct from the following strategy.

Remedial needs. The remedial strategy is based on the assumption that there are critical elements of knowledge at any stage of learning that must be mastered before moving on to the next level. In theory the problem is simple; it's a matter of matching the instructional content with what the student doesn't know. In practice remedial applications have proven ambiguous and discouraging. Chapter 4 includes some detailed speculation on why this may be so.

Catalytic processes. Snow (1972) conjectures that there may be important aspects of learning situations that "give birth to learning" or inhibit learning. That is, there may be catalytic processes that have desirable or undesirable effects. For example, a fortuitous matching of teachers and students might facilitate achievement in subtle ways. On the other hand, anything that leads to boredom or antagonism could have a substantial negative effect on student learning—even in the case of quite able students.

Educational continuity. There are many opportunities for educational discontinuities to occur, particularly when students are moving from one institution to another. In this case trait-treatment interaction represents the difference one can expect from appropriate or inappropriate choice of which course a student should take.

There is little utility in accelerating a poorly prepared student or requiring a better student to repeat familiar material. The differential utilities are associated with several outcomes: student achievement, student satisfaction, wasted time, etc.

Institutional priorities. In the larger context, it is especially pertinent to focus attention on the priorities of the institution. More specifically, what implications do institutional priorities have regarding the added value that may accrue from certain differential treatments? Special programs for special students may generate trait-treatment interactions because of financial or social considerations or simply because of presumed goodwill for the institution.

These various heuristic strategies can only be suggestive. As Salomon (1972) has noted: "It becomes quite clear that of the two intersecting regression lines [in a trait-treatment interaction], it is the *negative* [or flat] line which is of most interest and importance. What does the treatment do to learners so that low aptitude scorers benefit from it *more* than high scorers? And given a certain aptitude which correlates positively with a treatment, of what nature should the alternative treatment be?"

There are a number of possible answers to these questions, particularly if it is recognized that the *overall* utility of the treatment is the primary concern. For example, a given treatment may work quite well for one group of students, but for another group it may involve unmanageable material, boring classes, irrelevant educational objectives, inequitable treatment, an incompatible instructional style, deficient abilities, faculty resistance, student antagonism, damage to the reputation of the institution, etc. Any of these conditions might lead to the conclusion that, on balance, two treatments are differentially appropriate for two groups of students. But this variety of potential considerations illustrates that the design and evaluation of alternate treatments are bound to be fraught with subjective judgments. This is especially true of selection and exemption models (Chapters 5 and 6).

TYPES OF ASSESSMENT MEASURES

There are an indefinite number of ways to appraise traits of individuals for the purpose of guiding them into alternate educational treatments. There is room for variety even when the purpose is fairly specific. For example, Gunn (1967) reports that 75 California community colleges used 16 different standardized tests for English placement, not including a variety of local essay tests. It is not the purpose here to catalog the possibilities but to outline the general types of assessment measures relevant to this discussion. It is useful to differentiate five as follows.

A *proficiency test* is a way of measuring overall competency in a particular course or sequence of courses. There should be a reasonable match between the items in the test and the instructional content that the test is presumed to cover. This type of assessment is directed to the simple question of how much the student knows about the specific subject area, though depending on the subject area the measurement emphasis may be on factual knowledge, problem solving, practical applications, etc. This type of assessment is relevant to placement and exemption models.

While a *diagnostic test* is also an assessment of competency, it is intended to provide more detailed information concerning what the student can and cannot do. Ideally, a diagnostic test provides part-scores that are directly related to instructional alternatives and, consequently, to placement models.

Personal characteristics include almost any type of noncognitive trait (not concerned with abilities or achievement) that may be related in a useful way to alternate treatments. These might include background characteristics, interests, cognitive styles, attitudes, etc. Such measures are relevant in selection and assignment, particularly the latter.

Special aptitudes include a variety of fairly stable cognitive abilities, not readily improved through short-term training (verbal, mathematical, abstract reasoning, spatial visualization, etc.). Aptitudes typically related to general scholastic performance are more likely pertinent to selection decisions, while highly specialized aptitudes are more likely pertinent to assignment decisions.

The *high school record* provides performance information that can be valuable for some purposes but perhaps ambiguous for others. Whether a student has had certain courses is clearly important initial information to screen students for possible placement or exemption. College faculty typically know of particular courses in certain schools in which a grade of A or B represents adequate achievement for advanced placement in college. But the high school record does not usually provide decisive information concerning what the student knows, because the meaning of a given grade from a great variety of high schools is often uncertain and the content of ostensibly similar courses may not be comparable from secondary to higher education.

It is important to recognize that there are various ways to obtain the sort of assessment information required for alternate treatments. Some information is already available in the student's folder, but it is likely that the measurement of traits relevant to specific treatment alternatives will require specially selected tests. Such tests can be locally constructed, purchased from a commercial publisher, or obtained through participation in a national program. The logic of the decision-theory approach suggests that these alternatives be carefully considered with respect to appropriateness of the test, all the costs involved, benefits, conveniences, etc.

A principal advantage of the local test is the fact that it can be designed for the purpose in mind: the main disadvantage is the fact that the technical quality of locally constructed tests varies a great deal. Several very useful texts provide detailed discussion of test-construction techniques and descriptions of the sorts of tests commercially available (e.g., Ebel 1972a; Hopkins and Stanley 1972; Thorndike and Hagen 1969). A useful discussion of the selection of an achievement test is found in Katz (1958), and Buros (1972) edits the standard reference and critical guide to all published tests and national testing programs. The apparent cost of national programs is likely to be greater than that of local tests or individually purchased commercial tests. On the other hand such programs offer various advantages; e.g., research and technical services, off-campus national administrations, frequent revisions to insure security and continuing relevance, and fairness to a variety of curriculums.

VALIDATING ASSESSMENT MEASURES

A central question concerning assessment measures is whether they are valid for a particular purpose or use. Typically the validity of any educational measurement must be examined in several complementary ways. The main approaches that may variously apply to different alternate treatment models are outlined below.

At the outset it should be noted that establishing the validity of an assessment measure is a necessary but insufficient condition for establishing the usefulness of a model. The real value of guiding students into alternate educational experiences depends on the magnitude of the trait-treatment interaction, the importance of the criterion outcomes, the costs involved, the side effects, and so on. These matters of value and utility are taken up in the following section. Six general approaches to the question of the adequacy of the assessment measure are outlined here.

Trait-treatment interaction. The primary purpose of the assessment measure is to identify students who will perform differently in alternate treatments. Therefore, the trait-treatment interaction provides the most unequivocal evidence that such a measure is valid for this purpose. From Figure 3 it is clear that the extent of such validity can be inspected visually or stated mathematically. This is the sole basis of validation for assignment models and the preferred method for placement. In practice, however, this type of validation proves administratively difficult because it requires random allocation of students to alternate treatments. To some people such randomization raises disturbing questions of equity (if it's good for some, why not for all?) or experimenting at the student's expense.

From Figure 3 it is clear that neither of these concerns is really germane since the purpose is to avoid putting some students in inappropriate learning conditions. Nevertheless, completely randomized studies of certain adaptations would involve unacceptable experimentation (e.g., requiring well-prepared students to take a remedial course). Partial randomization may provide a way out of this dilemma. As Cronbach (1971) notes, the question of how many students to put into treatment A or treatment B is usually not very clear, particularly since one is often evaluating an adaptation precisely because of uncertainty regarding the outcome.

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FIGURE 5: Illustration of experimental placement in two treatments using partial randomization

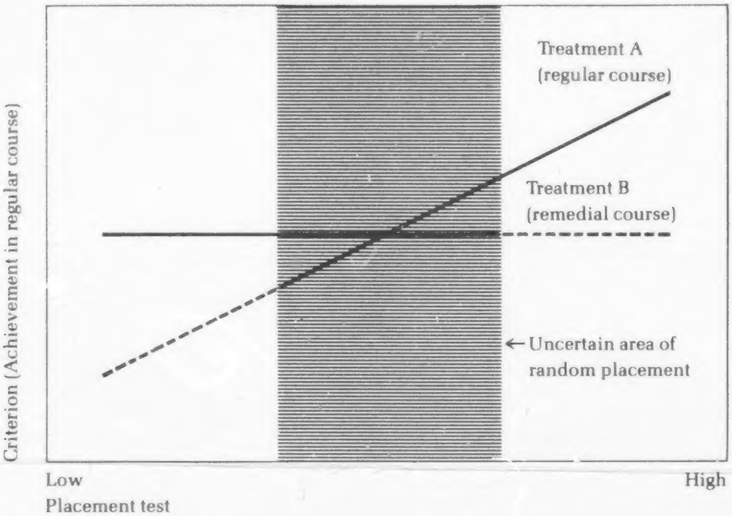

Figure 5 illustrates that uncertainty. The dotted area covers the middle third of the students as they line up on the assessment variable. For the sake of the illustration, it is assumed that high scorers (to the right of the dotted area) should clearly go into the regular course and low scorers (to the left of the dotted area) should clearly go into the remedial course. Since the appropriate treatment for those in the dotted area is debatable anyway, this middle third are placed randomly in one of the two treatments. As the figure indicates, this procedure yields an experimentally "clean" comparison based on the overlapping regression lines. Examining the outcome (preferably through analysis of covariance) for a sufficiently large group of such randomly placed students permits a sound conclusion as to whether or not there is a significant interaction. If there is, projection of the regression lines (dashed lines) helps to evaluate the overall utility of the treatments. Finally, it will be noted from the dashed lines that this method of partial randomization places very few students in disadvantageous treatments—probably no more than would result from arbitrarily deciding how many should go into the remedial section under routine operating conditions.

If there is simply no alternative, one can carry partial randomization to its logical extreme – i.e., no randomization, or assignment of all students to one of two treatments depending on whether they score above or below a particular score on a placement test. In this case one plots the regression lines for the two treatment groups and extends those lines to determine the point of intersection. This method is much less stable and less persuasive, though it can provide useful information when the same objective criterion is used for both treatment groups and when students are assigned to the two groups strictly on the basis of the placement test (referred to technically as explicit selection). In some cases this method may give the most objective evaluation that is reasonably available, but there is no substitute for randomization if one wants a dependable answer to the question of which treatment is really superior.[1]

The interaction method of validating the assessment measure dramatizes earlier arguments that a high correlation between a test and a course grade is not a sufficient condition to establish the usefulness of the test for sorting students into different treatments. Even though this method epitomizes the basic logic of the alternate treatment models and provides invaluable information for estimating utility, there are many reasons why it may prove impractical. For example, the social or administrative climate may not be conducive to this approach, or there may be inadequate time or resources. Often the cost of gathering information is not justified by the importance of the answer (e.g., because few students are involved, or the curriculum is changing, or a special criterion would have to be constructed, etc.).

Because of these considerations other approaches to validation are certainly more often employed and often more appropriate. These other methods, as described below, are based on assumptions that underlie the interaction condition. That is, these other means of demonstrating validity constitute good evidence that the interaction is there, if one went to the trouble to demonstrate it, and that the test is actually useful for guiding students into alternate treatments.

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[1] It is possible that some treatments may interact with a trait only if students are grouped homogeneously on that trait. Note, however, that this is not an argument against randomization, but rather an argument for random assignment to treatments within restricted ranges of the trait if such a condition is suspected.

Content validity. A basic assumption underlying trait-treatment interaction in several alternate treatment models is the idea that students should not be required to repeat material they already know. Consequently if a test is to be used to identify those students who have already mastered the material, it is important that the test adequately cover the pertinent material. Content validation simply means that experts (faculty) judge a test to be a reasonable representation of course content.

FIGURE 6: Illustrative scatterplot of final course grades and scores on an assessment measure (N = 400; r = .5)

Course grade	28-30	31-33	34-36	37-39	40-42	43-45	46-48	49-51	52-54	55-57	58-60	61-63	64-66	67-69	70-72
A					1	1	5	3	5	7	6	4	7	2	4
B			1	6	7	8	13	9	15	13	12	9	2	6	3
C		2	5	5	9	13	17	9	19	11	15	5	3	2	2
D		2	4	5	8	18	17	6	10	2	2			1	
F	2	1	3	10	12	11	8	6	4		1	1			

Assessment measure

Concurrent validity. One can suggest indirectly that a test is a fair representation of the content of a course by showing that students who have done well in the course score high on the test and those who have done poorly score low. This form of validation requires administering the assessment test at the end of the course and plotting scores against grade earned, as shown in Figure 6. The correlation of about .5 indicated here is fairly typical of the relationship between end-of-course grades and scores on a subject-matter proficiency test. This means of validation is quite limited because a measure of general ability might show a similar relationship.

Score gain. A third way to show that a test does measure what students learn in a course is to demonstrate that students who have taken the course (or series of courses) make higher scores than students who have not. A more satisfactory demonstration is to administer the test to the same students before and after taking the course and show that reasonable gains occur.

Predictive validity. This is the classic method for determining whether a test is valid for selection of students into a program or institution. It is simply a demonstration that students selected by the test perform better in the subsequent course or program than do unscreened students. This method applies to the selection models of Chapter 5 because an accurate predictor helps to sort students into trait-treatment interactions that maximize the overall success, satisfaction, and persistence of the student body. This method is often applied inappropriately to placement tests.

Subsequent success. In some alternate treatments, particularly those involving acceleration, it may be impractical to use any of the statistical demonstrations of validity outlined above. But the logic of the situation may suggest that the critical question is whether accelerated students succeed according to expectations in subsequent coursework. (This can be verified in the TTI framework; see Chapter 4 on validating advanced placement.) Therefore, the validating procedure becomes a question of determining whether those students accelerated by means of a particular test do well in following courses, are satisfied with their placement, remain in the institution, etc.

DETERMINING CUTTING SCORES

Let us assume that it has been decided that a group of students will be sorted into alternate treatments and a valid assessment variable for doing so has been identified. The next question is how many should go into one treatment and how many into the other? That is, what cutting score should be used as a decision rule? It is useful to distinguish several general approaches to this problem.

Fixed quota. The simplest procedure of all can be used when there is a fixed quota of students that can be accommodated in a particular treatment. There may be a fixed quota because the college can afford an honors program only if it is limited to 100 students, or the necessary equipment for an experimental class can handle only one section, or the administration decides that no more than one-third of all freshmen shall be exempt from a distribution requirement in social studies, and so on. With a fixed quota the cutting score is automatically set by selecting the lowest (or highest) students on the assessment measure until the quota is filled. Seemingly arbitrary quotas do, in fact, often represent a subtle balancing of values and subjective utilities relating cost to presumed benefit. The problem comes from the fact that an arbitrary quota may make little if any allowance for how many students profit from one treatment or the other, or in fact, whether there is any profit to be gained from alternate treatments.

Interaction method. In the ideal case one decides which students should go into which treatment purely on the basis of which alternative produces the best learning. But it is only in the assignment class of Models 1 and 2 where two treatments might be essentially equivalent with respect to cost, side effects, and other aspects of overall utility. In such idealized cases one would simply set the cutting score at the point where the regression lines intersect—as indicated in Figure 3. Or as Cahen and Linn (1971) have shown, there are several ways to identify cutting scores to the left or right of that intersection where one or the other treatment is definitely superior from a statistical standpoint.

Adjusted interaction method. Most alternate treatment models don't fit the ideal case because there are almost always other factors to consider. In Figure 3 the regression lines intersect at the point indicated with respect to the learning outcomes. But in a practical situation one is interested in where those lines intersect with respect to the overall utility of the different treatments. In changing the frame of reference from learning outcome to overall utility, the regression line for a given treatment is moved down to take into account high cost, up to reflect strong student endorsement, etc. Such adjustments will change the point of intersection and the cutting score. But the adjustments are necessarily subjective because cost, learning outcome, and student satisfaction cannot be compared directly. In a sense, this method is a blending of the two above. It formalizes the notion of reaching an administrative decision on the basis of objective facts concerning student learning—but rectified by important side considerations.

Predicted performance. In actual practice one way of deciding which students are likely to benefit from an alternate treatment is on the basis of predicted success or failure. For example, if the learning outcome in Figure 6 is a final grade in a regular first semester freshman course, then it would appear that some students at the low end of the assessment measure might profit from a remedial course in order to head off likely failure. This is a commonly recommended strategy (American College Testing Program, 1972b; Educational Testing Service, 1972; College Entrance Examination Board, 1967) with respect to those models here called placement and selection. But there are definite limitations to this approach that are spelled out in subsequent chapters.

Comparable performance. Students are exempted from course requirements in both placement and exemption models. In the case of exemption a cutting score is based on the notion of comparable performance. It is assumed that the maximum utility to be derived from exemption comes from setting the cutting score on a proficiency test at a point that indicates knowledge comparable to that of students who have made satisfactory grades in the subject course. For example, if the data of Figure 6 showed the relationship between course grades and proficiency scores earned at the *end* of the course, a cutting score of 50 might be selected because it represents approximately the average score of those who made a grade of C in the course.

Post hoc adjustment. There are a variety of situations in which an important ingredient in setting a cutting score is what happens after a provisional score has been set and students have been sorted accordingly. In placement and to some extent in assignment and selection the student's judgment regarding the appropriateness of his own placement is one of the most valid sources of data concerning the best position for a cutting score. In different models student feedback can be used in different ways. When students are allowed to change treatments after some initial experience, misplacements caused by an inappropriate cutting score are minimized. Too many changes, or complaints, or subsequent failures signal the need for correcting a cutting score level that might otherwise appear right.

EVALUATING OUTCOMES

Just as institutions should seek ways to adapt instructional programs to the individual characteristics of students, there is the corresponding responsibility to be reasonably certain that those adaptations are justified and worthwhile. Ideally, evaluating outcomes involves formal, analytic procedures such as those suggested by the early figures in this chapter, but often the situation permits only a carefully considered appraisal on the basis of available information. In any event a useful evaluation of outcomes depends on a clear sense of what the important criteria are.

The basic criterion for evaluating alternate treatments should always be whether the students' learning is enhanced, but there are other criteria like student satisfaction, side effects on the institution, and relative costs. Such factors are always involved, but they are frequently unstated or unrecognized. Thus it is an oversimplification to think of student achievement as the sole criterion of importance.

Moving from assignment to placement to selection to exemption, it becomes progressively less likely that there will be available any measure of academic achievement that is directly comparable across alternate treatments. This is partly a matter of definition (selection and exemption do not have a common subject-matter criterion) and partly because the purpose of the latter forms of adaptation are couched in broad educational objectives while the former are more concerned with specific instructional outcomes.

In general, the matter of evaluating outcomes can be regarded as a question of whether benefits of alternate treatments outweigh the various costs. There are three main types of educational benefits: to students, to institutions, and to society. It is mainly the first of these that includes quantifiable criteria.

Educational benefits to students. There are three useful criteria for estimating the educational benefit of alternate treatments to students—learning outcome, satisfaction, and persistence. Of these, learning outcomes is by far the most important. The measurement of learning outcomes is a complex field in itself (see Bloom, Hastings, and Madaus 1971; Kirschenbaum, Simon, and Napier 1971; Warren 1971; and Wittrock and Wiley 1970), though it receives surprisingly little attention in the typical classroom. In a particular course, emphasis may be upon cognitive or affective outcomes, upon factual content or processes, or upon theory or applications. The objectives of instruction require careful specification so that the criterion is a faithful reflection of the course and is strictly comparable for the alternate treatments. Learning outcomes are measured in several ways.

End-of-course grades frequently provide the best indication of learning outcome, but in some cases grades can be deceptive. When evaluation is based on the average grade earned by two groups of students in alternate treatments, there is always the question whether the grades are actually based on the same scale. A study of some 5,000 freshman grades at one institution (Willingham 1965) illustrates the potential problems. Even when corrected for average student ability, grades in alternate courses or alternate sections of the same course often varied by a letter grade or more. A further problem is the fact that different instructors can be expected to value different types of student achievement in assigning grades.

Thus, unconscious grading variations can make it very hazardous to assume that a grade criterion is really comparable across groups and that an observed difference in average grade earned is really due to the different treatments involved. Ordinarily a satisfactory way around this problem is to use a common departmental examination as the criterion of learning outcome. It should be remembered, however, that even a common examination may not yield comparable scores unless it is scored objectively or in a manner so that individual graders' biases are not systematically reflected in one group of students or the other.

A handbook by Bloom, Hastings, and Madaus (1971) contains a number of chapters on measuring outcomes in individual subject areas. In addition to subject-matter content, their volume emphasizes the measurement of learning outcomes that vary according to the cognitive process involved (e.g., comprehension, synthesis, application, etc.). Similarly, other writers argue (Manning 1969; Kagan and Kogan, 1970; Messick 1970) that the goals of instruction might reasonably include other objectives such as altering the student's problem-solving strategy or characteristic mode of thinking. In experimental evaluations of alternate treatments it is often useful to construct carefully the multiple-outcome criteria that are especially relevant to the differences between treatments even if such criteria would not normally be used in assigning course grades. Ordinarily, however, the main concern is that any comparative evaluation of student achievement be based on measures of learning outcome that are truly comparable for the alternate instructional treatments. This raises another problem.

One of the more common forms of alternate treatment is to sort students into a regular versus an enriched section (see Models 6 and 9). Since the whole point of this procedure is to vary the objectives and the content for the two sections, there is no defensible way to develop a comparable criterion of student achievement for the two treatments. What one can do with this situation is determine whether different students tend to have greater long-term success or are likely to be more satisfied with one treatment or another. See Model 9 for discussion of a study by Sweet and Nuttall (1971) that illustrates how one should and should not evaluate this sort of alternate treatment.

Aside from this specific case, student satisfaction has important advantages as a criterion. It is always a relevant consideration in evaluating the educational benefit of any type of treatment. Furthermore, it is always comparable across treatments, at least in a loose sense. In some situations it may be the only available information that can be so compared. For these reasons several writers have advocated or used student satisfaction as a criterion (Dunn 1966; Eastman 1969; Hills 1971; Modu 1970).

A third criterion of student benefit is persistence, or more generally, what do the students do after the adaptative treatments? Familiar measures of this genre are proportion of freshmen that drop out within a year or proportion that eventually graduate. Moore (1970) cites other possibilities that make it clear that "successful persistence" can mean quite different things. For example, in the compensatory program he describes, success means movement into a regular curriculum, a community training program, an upgraded job, or a new job that offers possibilities of advancement.

These vagaries illustrate the strengths and weaknesses of persistence as a criterion of educational benefit. Without doubt, whether a student persists to an educational goal is a highly relevant criterion, but it requires a careful understanding of educational goals to know whether successful persistence should mean leaving a program or staying in it. By the same token, students drop out of college for a host of reasons having nothing to do with their experience in a particular course of study or even education in general. Thus persistence can be an important criterion, but it is often ambiguous and probably often insensitive to alternate educational treatment.

Educational benefits to institutions. On any campus the decision to offer a remedial course, initiate an honors program, or waive distribution requirements by special examination is a decision reached after much discussion of many pros and cons. In addition to the primary question of whether student learning will benefit, there are inevitable questions concerning how the college will benefit as an institution. It would be shortsighted not to recognize that institutional considerations are often just as important as pedagogical factors. While it is quite necessary to include institutional benefit in any overall evaluation of the outcome of an educational treatment, the criteria are often subjective or difficult to relate directly to educational benefit or cost.

Of course economic benefits can be related easily to cost, particularly if the benefit merely results from the fact that the special treatment is less costly than a regular treatment. Other seemingly advantageous outcomes such as equalizing the distribution of students across classes may be much more difficult to evaluate in economic terms. An even more subtle factor is the effect that alternate treatments may have on the image of the institution and the impact that image may have on recruitment efforts. And in the end educational treatments will tend to survive if they please the faculty and are administratively practical. These latter considerations are sometimes ridiculed as legitimate criteria for deciding curriculum matters, though the wisdom of time and circumstance usually has a way of getting built into the evaluation, whether anyone plans it that way or not.

Educational benefits to society. There are several ways in which assignment, placement, selection, and exemption can have a social benefit beyond the institution—some of which may not have an obvious connection with the primary rationale of the program. By and large, social effects are either difficult to quantify or difficult to attribute to the particular program, or both. It is also safe to say that such effects are little understood, little studied, and highly dependent upon local circumstances. Consequently, only a few potential social benefits that should bear upon the individual institution's evaluation of outcomes are mentioned here.

One of the more obvious social benefits concerns access of minority students, which may depend heavily on institutions' willingness to adapt programs to students' needs. Similarly, higher education's ability to adapt its traditions of exemption and credit to the individual characteristics of nontraditional learners will have a critical bearing on the extent to which institutions of higher education can serve adults and the professions. Finally, the efforts of colleges to tailor their instruction to individual students' preparation can be markedly beneficial in freeing the secondary school from a curriculum straitjacket and in promoting a rational continuity in the education of young people moving from secondary to higher education.

Without belaboring the obvious, this chapter can be closed simply by saying that these benefits – educational, institutional, and social – must be stated as specific criteria as clearly as possible and weighed against the estimated cost of a proposed program (treatment). As Stallings et al. (1972) note, there have been few cost-benefit studies of alternate educational treatments. Alkin (1970) provides a useful theoretical discussion of the topic. Practical interest has centered especially on the possibility that exemption can cut costs (see discussion under Model 11 in Chapter 6). But costs are not measured in dollars alone; there is also inconvenience, lost time, and low morale. Costs are also measured ultimately in educational practices that turn out to be unsound or inequitable. Such ultimate costs can only be minimized through hardheaded appraisal of the objectives and outcomes of educational treatments.

3

Assignment to Alternate Pedagogies

According to the framework outlined in the previous chapter, assignment refers to a class of alternate treatments in which individuals with different aptitudes or personal characteristics are assigned to treatments that have common objectives regarding learning outcomes. Freely interpreted, this means altering the conditions of learning to suit individual differences. This form of individualization has deep roots. For 50 years it has been practiced and worried in the public schools under the name of ability grouping. Throughout this period ability grouping has been characterized by endless research drawing no clear conclusions about whether grouping is useful or not.

Colleges have practiced ability grouping to a limited extent and without arousing a great deal of interest in any quarter. Most of the details of the ability grouping controversy apply to elementary and secondary education. The history of this movement deserves brief scrutiny—partly because it represents an important and puzzling phase in the effort to individualize instruction, and partly because it helped to focus attention on the trait-treatment interaction (TTI), which is now the dominant theme of the best research in this area and the most promising approach for useful applications in the future.

FROM ABILITY GROUPING TO TTI RESEARCH

Ability grouping became common in elementary and secondary education around 1920 when newly developed standardized tests provided objective measures of intellectual performance. Despite a main concern with sorting students by intellectual level, it is important to recognize that ability grouping has served many purposes in the public school. A recent report of the National Education Association (1968) lists 26 types of ability grouping, most of which are administrative or structural in nature and are designed to utilize facilities, departmentalize, deal with grade designation, or special situations, and so on. Nonetheless, the controversy centers on whether it is good to separate bright and dull students.

The main argument favoring ability grouping has been based on the assumption that it allows students to move at their own pace, whereas a teacher tends to teach a heterogeneous class at the level of the average or even the lower ability students. Providing for individual differences in the heterogeneous class is difficult and inefficient, while materials and methods used in a homogeneous class are presumably appropriate for a large proportion of students. It is further assumed that pupils are more likely to do their best when challenged by others at their own ability level.

Arguments against ability grouping have circled especially around the notion of stigma. Students in advanced groups may develop snobbish attitudes, but, more important, lower level students and their teachers may develop low expectations regarding what it is possible for them to achieve. Furthermore, it is often argued that lower ability students can and should profit from the stimulation of more capable students and more advanced material.

Discussion of the merit of ability grouping has always had social class overtones, and in the 1960s grouping became an active racial issue. It is not surprising that there has been a tremendous amount of research on the question. In fact there have been one or more major research summaries prepared each decade since Rock's review in 1929. The outcome of all this effort has been puzzling and strangely inconclusive.

Most writers who have summarized the literature have been unable to find any clear superiority for homogeneous or heterogeneous grouping (e.g., French 1959; Ekstrom 1961; Borg 1966; Goldberg, Passow, and Justman 1966). Others see the data differently. Dahllöf (1971), for example, concludes that the achievement advantage that accrues to the able student from ability grouping more than offsets any possible disadvantage to the achievement of the less able student. *Thus heterogeneous grouping results in* "*a loss in intellectual* efficiency." Heathers (1969), on the other hand, argues that recent studies indicate that ability grouping is associated with detrimental effects to slow learners. Interestingly enough, Borg's (1966) study in Utah schools is cited as corroborating evidence by both Dahllöf and Heathers even though they expressed opposing views.

In a comprehensive review of the educational and social aspects of ability grouping, Findley and Bryan (1971) take a middle-of-the-road view. They say, "some studies offer positive evidence of effectiveness of ability grouping in promoting scholastic achievement in high-achieving groups; studies seldom show improved achievement in average or low-achieving groups." But they go on to say, "The effect of grouping procedures is generally to put low achievers of all sorts together and deprive them of the stimulation of middle-class children as learning models and helpers." And finally, after its careful review of the work in this area the National Education Association (1968) decided that "research results have been inconclusive."

It is discouraging that so much research could cause so much confusion, but it is worth asking why. There appear to be five main reasons.

1. A great deal of the research is of poor quality – poorly conceived, inadequately controlled, and not well analyzed.

2. There is great variety in the purpose of this research, both from study to study and within the same study. Thus multiple criteria for evaluating outcomes (student achievement, social effects, personal effects, etc.) generate multiple interpretations of results.

3. In most cases students have been assigned to groups on the basis of intelligence tests or general ability. It is hard to group any other way in grades K through 12, but sorting on the basis of general ability undoubtedly limits the effectiveness of individualization for some purposes. On the one hand this procedure cannot optimally match instruction and subject matter. Furthermore, it is doubtful "that there are any well-established interactions of in-

structional method with mental age . . . ." (Cronbach 1967; see also Bracht 1970 for a confirmation).

4. As a separate consideration, in many studies students are assigned to groups on the basis of several measures simultaneously—sometimes including unspecified subjective judgment. This leaves the researcher and the administrator not knowing exactly what happened or how to replicate it.

5. Of most importance is the fact that few grouping studies have been based on any clear idea of different instruction for different ability groups. According to the conventional wisdom, when the range of ability is narrowed, the teacher can more readily adapt content and method to the student's level. The problem is that teachers do not make the proper adjustments on their own. Two studies have clearly shown that narrowing range of ability does not, in itself, have any beneficial effect on achievement (Millman and Johnson 1964; Goldberg, Passow, and Justman 1966). And it has been suspected for some time (Ekstrom 1961) that the studies most likely to show a positive effect of ability grouping are those that use differential treatment at different ability levels.

In retrospect it is not difficult to understand why research has shed so little light on the usefulness of ability grouping. As indicated by the specific inadequacies cited above, this research has violated most of the essential points of the decision theoretic model. Perhaps the most critical shortcoming has been the failure to design ability grouping studies so that there is a clear relationship between the way students are grouped and the way they are taught. The findings suggest the possibility that whenever instructional adjustments were made in ability grouping studies, they were more likely to be enrichments that would favor advanced students rather than any systematic effort to help all students.

There has been little research in higher education that corresponds to that on ability grouping in the schools. Limited interest in the problem at the college level is partly due to the simple fact that students sort themselves into whatever sections happen to be open at registration. Furthermore, there is considerable flexibility in grouping college students in individual subjects, so students are more often sorted according to subject-matter competency, and this sorting is called placement, which is discussed in the following chapter.

College faculties have frequently studied the relative merit of different teaching methods and modes of instruction. Much of this research has been reviewed in two monographs by a research team at the University of Oregon: a comparative analysis of teaching methods by Dubin and Taveggia (1968) and an evaluation of televised instruction by Dubin and Hedley (1969). After careful examination of 133 studies, these authors concluded that (1) no teaching method (lecture, discussion, independent study, etc.) is generally superior to any other, and (2) students are not fond of televised instruction, but they learn just as much from that medium as from a regular classroom. Others reviewing research on instructional methods have come to much the same conclusions (Wallen and Travers 1963; Milton 1973; Trent and Cohen 1973; Jamison, Suppes, and Wells 1974).

The era of intensive research on ability grouping has probably come to a close, but this long history of null findings set the stage for a new theoretical and experimental approach that gathered momentum in the 1960s. If grouping doesn't work by itself, then attention should be paid to the instructional methods most appropriate for the different groups. If one method of teaching is not generally superior, then it must be determined which methods might be best for which students. In either event the obvious answer is to give more attention to the relationship between learning and individual differences.

Despite Cronbach's influential discussion of this problem in 1957 research on "learning and individual differences" was initially slow to get under way. It was almost a decade later that an important conference bearing that title was held at the University of Pittsburgh (Gagné 1967). At this conference a number of leading theoretical psychologists followed the theme that no instructional methods or laws of learning can apply generally to all students, but at that time there had been limited experimental results on what methods work with what students. In 1969 Cronbach and Snow completed what is undoubtedly one of the most frequently quoted unpublished reports ever written on instructional research. This report did two things.

First, it clearly defined TTI (or as they called it, ATI for aptitude-treatment interaction) as the appropriate experimental paradigm for research on grouping as well as variations in instructional methods. Thus the well-conceived study includes careful specification of the way students are grouped, the way treatments are varied, and the way learning outcome is measured. The desideratum of TTI research is the intersecting regression lines which show that different groups do better under different treatments (see Figure 3).

Second, the Cronbach-Snow report surveyed and often reanalyzed the data from a number of studies that included TTI possibilities. That review provided many illustrations of how TTI research could be applied to instructional questions, but the outcome was discouraging. As the authors put it, "There are no solidly established [TTI] relations even on a laboratory scale and no real sign of any hypothesis ready for application and development."

Perhaps other researchers took this as a challenge, but more likely searching for TTIs has some of the fascination of an Easter egg hunt. In any event, there was subsequently a flurry of articles and reviews of research in this area (e.g., Bracht 1970; Lesser 1971; Salomon 1972; Snow 1972; Berliner and Cahen 1973; and Koran 1973). Recent studies (see Snow 1972 in particular) give much greater grounds for optimism concerning the possibility of finding TTIs that can be useful in practical educational situations.

The effect of all these developments has been to identify the trait-treatment interaction as one major means of adapting the educational program to individual differences. This approach characterizes the assignment models described in this chapter, and it comes about as close as one can to an ideal case of the decision-theoretic strategy outlined in the previous chapter. But in these first two assignment models the practical educational implications are rather limited. This is mostly because this means of adapting to individual differences has only recently developed as a research interest, and unlike subsequent models, there are almost no research-based operational programs one can point to. Therefore, it is doubtful that there has been enough research or conceptualization in this field to warrant a general review of classroom implications.[2] Furthermore, there is an almost endless variety of potential trait-treatment interactions.

The following sections describe and illustrate two general ways

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[2] This conclusion refers to implications based on clearly demonstrated trait-treatment interactions. There is, on the other hand, a widespread interest among educational practitioners (particularly in community colleges) in experimental programs designed to adapt teaching styles to learning styles (e.g., see Joyce and Weil 1972; Sperry 1973; Riessman 1964). For an especially useful review of cognitive style and the teaching-learning process, see Witkin and Moore 1974.

(Models 1 and 2) in which the conditions of instruction can be varied in order to match individual learning characteristics. One is to vary the method or mode of instruction; the other is to match instructors and students. One should be aware that there are various other tactics that are sometimes called grouping (e.g., Models 3, 6, 9 in Table 2) but actually involve different strategies. The labels are arbitrary, but the educational distinctions are not.

MODEL 1: METHOD VARIATION

In considering how one might adapt instruction to different types of students all working on essentially the same course objectives, the first strategy that comes naturally to mind is to vary the way the material is presented. There has been a considerable amount of research on modes and methods of teaching, much of which is concerned with very specific problems or teaching techniques. This work is summarized in great detail in successive editions of the *Handbook of Research on Teaching* (Gage 1963; Travers 1973; see especially chapters by McKeachie in the former and Trent and Cohen in the latter). At a more practical level McKeachie's (1969) book on "teaching tips" is highly recommended for its interpretations of research bearing on the day-to-day problems of handling a college class.

But the purpose here is to consider ways of identifying the trait-treatment interactions that can make it possible to adapt instruction

MODEL 1: Method Variation

Alternate treatments	Purpose of treatment variations
Ⓐ Regular course	To match learning conditions with student characteristics
🄰 Alternate instructional method	

systematically to individual differences. This research is much more limited than that on teaching methods generally and is far from the point of generating principles that can be generalized and put into practice. Current research is at the stage of describing the process of searching for such treatments and considering what form they might take.

The best review of TTI research pertinent to this model is Berliner and Cahen's chapter in the 1973 *Review of Educational Research.* They provide an extensive bibliography and suggest useful ways to classify adaptations of instruction for different groupings of students. The main types of assessment variables that have been used in TTI research are ability, personality, and status (sex, race, etc.). Four main ways that treatments have been varied might be distinguished: according to conceptual strategy, structural arrangement, competing ways to teach specific subjects, and instructional mode.

Of the various ways that an instructor can alter his conceptual strategy, one of the most common is to use an inductive versus a deductive approach in instruction. Tallmadge and Shearer (1971) provide a good example of a TTI between this type of instructional variation and student anxiety. In a study of Navy enlisted men they found that anxious students learned better in an inductive discovery treatment while students who were not anxious learned better in deductive expository treatment. This finding was consistent for criteria that reflected either rote learning or understanding.

The structure of an instructional setting can vary according to whether class procedures are flexible or inflexible, whether lecture or discussion methods are used, whether prescribed or independent study is encouraged, and so on. An interesting study by Domino (1971) illustrates a TTI between the achievement orientation of college freshmen and how a course was taught. Students who preferred to achieve through independent activity and those who preferred conformance were assigned to classes that were taught in an independent or conforming manner. Students who were taught according to their stylistic preference scored higher on multiple choice examinations and on ratings of factual knowledge exhibited on an essay test. There was also a significant interaction in the students' expressed satisfaction with the course. Those who were taught according to their preferred style gave the course high ratings and also thought the instructor did an effective job.

There have always been extended and sometimes heated arguments concerning the best way to teach a particular subject matter. Most parents are quite familiar with the controversies concerning phonic versus whole word methods of teaching reading or new math versus conventional math. It seems highly likely that such competing methods may be individually superior for different types of students. For example, in Chastain's (1970) data on teaching Spanish to college students, neither the audiolingual nor the cognitive method was generally superior, but it appears that students with low verbal aptitude do better in the audiolingual program while students with high verbal aptitude profit more from the cognitive approach.

Instructional mode can be varied through the use of various alternate media; the most prominent are television, programmed instruction, and computer-assisted instruction. Since these media are often used as a supplement or alternate to conventional instruction, it seems especially appropriate to ask which students can best profit from which media under what conditions. There has been a vast amount of research on educational media, but evidently no systematic effort to identify trait-treatment interactions. On the basis of a limited review, Berliner and Cahen (1973) describe the results of interaction studies concerning programmed instruction as "completely ambiguous."

METHODOLOGICAL CONSIDERATIONS

Model 1 is fairly clean and straightforward from a technical standpoint, partly because it corresponds closely to an ideal expression of the decision-theoretic approach outlined in the previous chapter. And since it has not moved yet from a research strategy to an educational strategy, there is almost no conventional wisdom or routine procedure for applying this sort of adaptation. There continues to be heavy emphasis on searching for TTIs. As useful interactions are found, validating the assignment process is a matter of verifying that the interaction does occur with different groups of students, exploring the nature of the interaction under different conditions, and determining whether it holds up after the novelty of the experiment has worn off.

Evaluating an assignment strategy ought to include several considerations. Even though one can consistently demonstrate an achievement interaction between a particular student trait and alternate treatments, there may be other learning outcomes that need to be considered; e.g., attitude toward the subject or ability to use knowledge in other contexts. Differential assignment of students to alternate treatments should be based on reasonable assurance that the procedure is beneficial or neutral with respect to desirable outcomes not represented in the usual end-of-course examination. Similarly, student and faculty satisfaction can be important criteria, and there may well be other side effects to take into account.

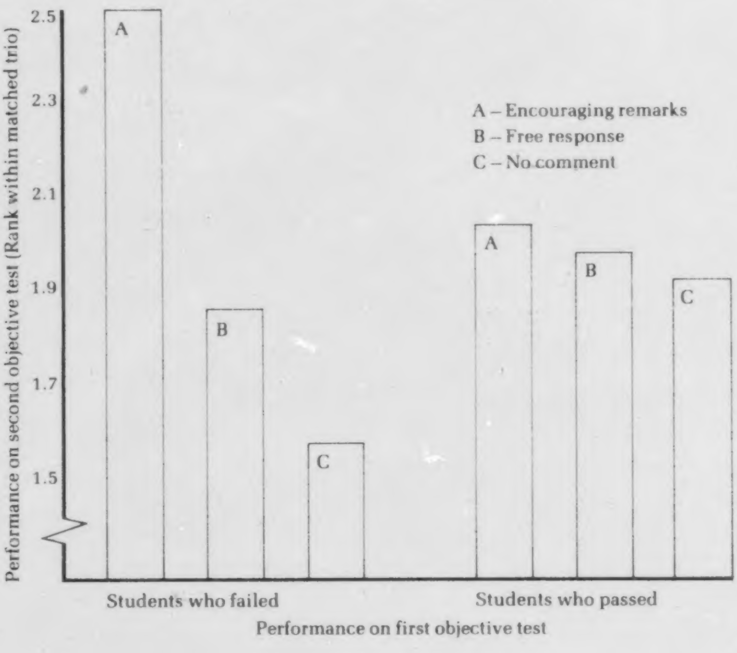
Defining a cutting score for assigning students to one treatment or another depends very much on relative cost, administrative factors, values in the situation, and so on. But if there is a substantial interaction, the cutting score in this model is likely to be fairly close to the point where the regression lines of Figure 3 intersect. Otherwise, one has to have a good justification for assigning some students to a treatment that is demonstrably inferior for them. An interesting complication arises from the fact that successful TTI research may turn up several ways to group students – perhaps more ways than prove administratively practical. That would be true of any useful TTI if there is only one section of students. One answer is to generalize this model so that it includes implicit assignment – that is, grouping or differential treatment within the same class. This is a very common practice in elementary school where the same students typically stay together for different subjects.

An ingenious study by Page (1958) shows how Model 1 can be experimentally tested and applied in a class without any actual grouping of students. Page had 74 randomly selected secondary school teachers perform the following study with their 2,139 unsuspecting students. In each class trios of students were matched on the basis of grade earned on the first objective test in a subject and then randomly "assigned" to one of three treatment groups. Group C received only a grade with no comment on the next test. Group A had predetermined encouraging remarks written on the next objective test given in the class. Group B received whatever free response on the next test teachers felt appropriate in the individual case.

Figure 7 shows the results. The three treatments had little differential effect on students who had received any passing grade on the first test, but there was a clear effect on students who had failed. To a striking extent failing students who had received an individualized comment of encouragement did better on the next test than did a matched student who received no comment. An interesting sidelight is the fact that the teachers started the study firmly believing that their better students were more responsive to their written comments, though the opposite proved true.

The study illustrates quite well that controlled research and educational adaptations involving groups of students need not require physical sorting of students. There are many ways to generalize this type of study. One could look for other student traits that might

FIGURE 7: Average achievement ranking for three matched groups who had received different written comments on an earlier test (Adapted from Page 1958)



interact with these particular treatments. More important, one could examine experimentally a variety of adaptations that are feasible within a class; e.g., different forms of independent study, special projects, supplementary reading, practicum experience, etc.

MODEL 2: MATCHING STUDENTS AND TEACHERS

The individual-environment fit has become a familiar research topic, and various lines of evidence suggest that an optimal fit leads to higher achievement and greater satisfaction (Pervin 1968). In the description of Model 1 there was discussion of changing the learning environment by altering instructional methods. The teacher is another salient aspect of most learning environments and is also an aspect likely to interact differentially with students. Teachers create their own learning environment through characteristic values, habits, styles, and attitudes. Such teacher characteristics constitute conditions of learning that are not readily manipulated like instructional methods but can be altered through student-teacher matching.

Administrative matching of students and teachers is quite rare in higher education, though of course students give much informal attention to the important business of selecting instructors. There is a great deal of interest in this problem at the elementary level where teachers spend much of the entire school year with one group of pupils. An extensive study by Thelen (1967) exemplified the

MODEL 2: Matching Students and Teachers

ALTERNATE TREATMENTS	PURPOSE OF TREATMENT VARIATIONS
Ⓐ Professor X	To match teaching style with learning style
Ⓐ Professor Y	

rationale that has made teacher-pupil matching a principal grouping strategy.

Thelen had 13 teachers nominate pupils who seemed to respond especially well in their individual classes. Subsequently, each teacher taught a regular class and an experimental class of pupils who statistically resembled those pupils that individual teachers had found "teachable." The experimental classes did not make higher scores on objective achievement tests, but they did receive higher grades in their classes, and both pupil and teacher satisfaction were higher in the "teachable" classes.

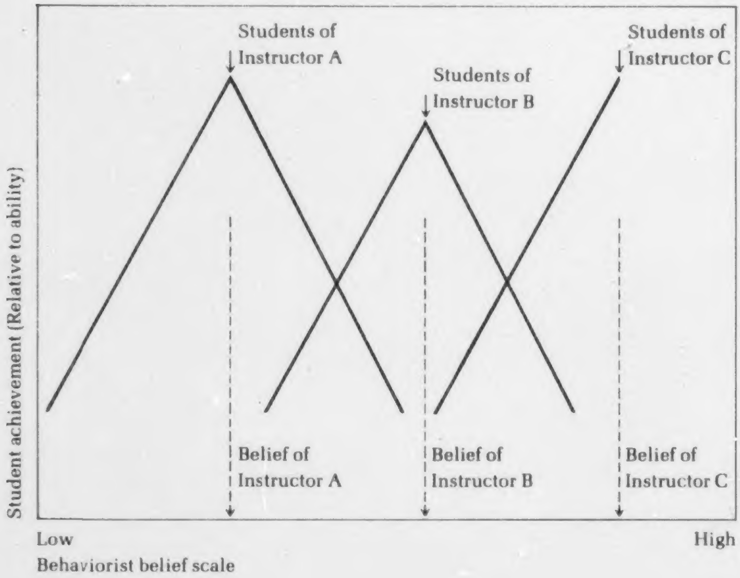
The positive effects may be important even if they were due to nothing more than altered attitudes. On the other hand, the findings would not have general significance if greater satisfaction in the "teachable" groups were due to unconscious bias or short-term enthusiasm for the experiment. Such a possibility seems less remote because of the lack of any sound theory about why the experimental classes should be superior. Supposedly, teachable classes chosen in this way have less energy tied up in nonlearning concerns about interpersonal relationships, authority, sex identification, and so on. But there is no clear connection between these environmental dynamics and how the pupils were selected – the same weakness found in most of the grouping studies at the lower grade levels.

Studies at the college level have typically incorporated a clearer connection between matching and outcome measures. For example, Hall (1970) examined the discrepancy between the student's perception of an ideal teacher and the actual characteristics of his instructor. Hall found a substantial negative correlation ($r = -.42$) between an overall discrepancy score and the student's satisfaction with the course, but the discrepancy score was not related to grade earned. Looking only at these two studies one might conclude that matching student and teacher is likely to alter only the affective tone of the classroom. That might typically be true, but some research indicates that matching can affect student performance also.

A well-known study by McKeachie et al. (1966) matched students who were high or low in their need for affiliation (friendliness) with instructors who were rated either high or low as warm individuals who took personal interest in students. With women students the results were inconsistent, but in the case of male students in mathematics and psychology three studies yielded the same result. Students were more likely to make better grades when matched with the instructor whose behavior matched their personal needs.

A more dramatic example comes from Majasan (1972) who hypothesized that a student is likely to achieve more if he shares his instructor's basic beliefs about the subject field. Majasan measured the "belief in behaviorism" of 12 psychology instructors and their students in five colleges. He then compared congruence of student-instructor beliefs with the students' achievement relative to their aptitude. The results were striking. As shown in Figure 8, students whose beliefs were very similar to the instructor's achieved well; the more the student's beliefs differed from those of the instructor the poorer his achievement. The author concludes that as such

FIGURE 8: Schematic representation of achievement of students in three classes showing highest achievement for students whose attitude toward behaviorism is similar to that of their instructor (Adapted from Snow 1972)


Students of Instructor A
Students of Instructor B
Students of Instructor C
Belief of Instructor A
Belief of Instructor B
Belief of Instructor C
Student achievement (Relative to ability)
Low
High
Behaviorist belief scale

findings are confirmed they should be used as a basis for matching students and instructors to enhance learning.

The methodological considerations in studying or putting this Model 2 into practice are much the same as for Model 1. It is a research model of some interest and potential usefulness, but the Majasan study illustrates an inherent uncertainty in student-teacher matching even when achievement advantages are definitely demonstrated. It is not at all clear that there is long-range benefit in matching students consistently with instructors who share similar beliefs. Such matching could, in some subjects, have the subtle but damaging effect of limiting the student's intellectual flexibility or giving him an incorrect view of the field. It may be that research in this area is best directed to the long-range goal of developing improved information about instructors' characteristics and styles so that students are better able to choose their own conditions of learning.

4

Placement within a Sequence

Placement is a term often used loosely to refer to a variety of methods by which students are sorted or guided into alternate sections or courses. Table 2 suggests useful distinctions between several such methods and also restricts the term placement to a particular grouping strategy. In this report placement is concerned with a class of alternate treatments that has these characteristics: students are placed in alternate treatments on the basis of competency in specific subject matter; treatments vary according to how elementary or advanced the subject matter is or at what pace the student is expected to master material; achievement at the end of the instructional sequence serves as a common criterion to evaluate the performance of students who were initially placed at different points in the sequence or moved at a different pace.

Generally speaking, placement is intended to get students started at the right level in a subject according to their preparation and moving at their own speed. There are many applications that differ from one subject to another; e.g., deciding which French course is best for students who have had varying amounts of high school French, determining whether a student is ready to go into calculus, offering some well-prepared chemistry majors a speeded first course in chemistry, advising some students to take remedial work in English composition, etc.

How are such decisions made? There are a variety of placement strategies that are mostly intuitive and not very systematic. Hills (1971) has decried with some vigor the almost complete lack of theoretical development, practical research, or evaluation of placement methods. A common sense strategy would be to decide what the student ought to know, determine what he already knows, and teach him what he needs to know as reasonably fast as he can learn it. These bromides come fairly close to the truth, but very often placement applications do not follow this logic. A major reason is that the common sense strategy is not so simple as it sounds.

To decide what the student ought to know, it is necessary to understand the structure of the subject matter and the objectives of instruction. To determine what the student already knows, it is necessary to construct useful placement tests that reflect the structure of the subject. To teach the student what he does not already know, it is necessary to relate the test results directly to the instructional sequence and to alternate placement possibilities. In the language of Chapter 2, it is necessary to design a placement strategy that creates a useful trait-treatment interaction.

In order to suggest systematic approaches to this problem that may prove generally useful, some basic ideas that have developed in theory of instruction in recent years should be understood. The practical outgrowth of this theoretical development has been various forms of individualized instruction. It is useful to think of placement as a special form of individualized instruction; in fact, the two merge at certain points. As is explained below, decision theory and instructional theory are joint parents of the view of placement expressed here. So the next two sections on instructional theory and individualized instruction form the foundation for the following sections on placement tactics and applications of placement.

INSTRUCTIONAL THEORY

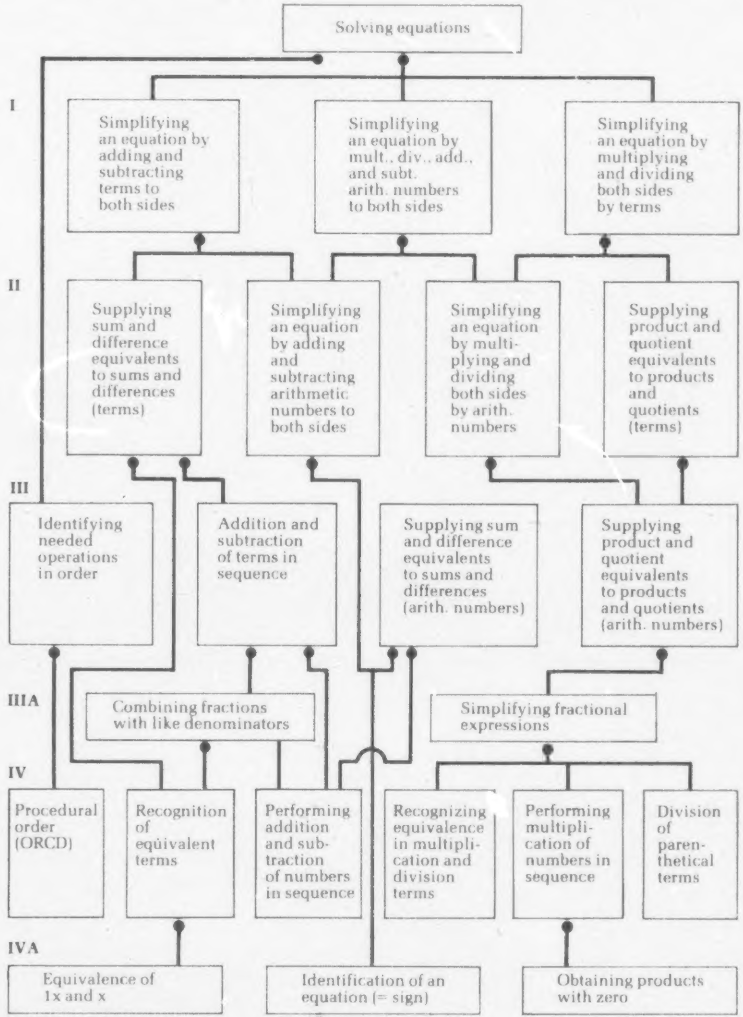
There has always been a rich array of informal assumptions concerning the proper way to teach young people. In the past half-century psychologists have added systematic learning theories to traditional pedagogy, but it is widely acknowledged that pedagogy is intuitive and unsystematic and that learning theory has had limited bearing on how students learn in the classroom. It was only recently that a separate movement to develop instructional theory began to take hold. For example, Atkinson (1968) cites the lack of instructional theory as a principal problem in initial work on computer-assisted instruction (CAI) in reading in the early 1960s.

But elsewhere Atkinson (1972) noted that a number of theorists have begun to tackle the pragmatic problems of instruction (e.g., Bruner 1966; Carroll 1963; Gagné 1970; Glaser and Nitko 1971; and Hilgard 1964). Instruction theorists have concerned themselves with a variety of problems such as how students learn, heuristic methods of teaching, how to motivate students, defining objectives of instruction, and so on. In this report interest is more focused. Since placement is concerned with the problem of matching instructional content with student preparation, the most relevant theory is that concerned with the structure and sequence of instruction. In this connection a central idea has been the notion of learning hierarchies.

LEARNING HIERARCHIES

Gagné (1970), who is primarily responsible for developing the idea of learning hierarchies, defines the notion as follows. A learning hierarchy is created by analyzing a learning task into simpler capabilities and continuing that analysis to the point of defining a set of capabilities having an ordered relation to each other—ordered in the sense that one task needs to be learned before another. The best description is an illustration. Figure 9 shows an early hierarchy for solving algebraic equations.

FIGURE 9: Learning set hierarchy for the task of solving linear algebraic equations (Large dots at the bottom of boxes indicate the relatedness of particular lower level and higher level learning sets, in the sense that positive transfer is predicted.) (From Gagné and Paradise 1961 . Copyright 1961 by the American Psychological Association. Reprinted by permission.)


Solving equations
I
Simplifying an equation by adding and subtracting terms to both sides
Simplifying an equation by mult., div., add., and subt. arith. numbers to both sides
Simplifying an equation by multiplying and dividing both sides by terms
II
Supplying sum and difference equivalents to sums and differences (terms)
Simplifying an equation by adding and subtracting arithmetic numbers to both sides
Simplifying an equation by multi-plying and dividing both sides by arith. numbers
Supplying product and quotient equivalents to products and quotients (terms)
III
Identifying needed operations in order
Addition and subtraction of terms in sequence
Supplying sum and difference equivalents to sums and differences (arith. numbers)
Supplying product and quotient equivalents to products and quotients (arith. numbers)
IIIA
Combining fractions with like denominators
Simplifying fractional expressions
IV
Procedural order (ORCD)
Recognition of equivalent terms
Performing addition and sub-traction of numbers in sequence
Recognizing equivalence in multipli-cation and division terms
Performing multipli-cation of numbers in sequence
Division of paren-thetical terms
IVA
Equivalence of 1x and x
Identification of an equation (= sign)
Obtaining products with zero

In this figure each box indicates a specific capability. The large dot under each box shows which of the lines leading from prior boxes are intended to designate subordinate capabilities. This hierarchical analysis was carried out by asking what an individual would have to know how to do in order to perform each successive task, starting from the top and working down. For example, the first row of boxes at the top indicates that three distinct tasks are involved in solving algebraic equations. It is possible to know how to do each without knowing how to do the others, and each is based on a somewhat different pattern of subordinate knowledge.

In order to see whether the hierarchy really worked, the authors taught 118 seventh grade students to solve equations. Some did well and some did poorly, but the essential question was whether students learned particular boxes only if they had mastered the appropriate subordinate boxes. For example, passing successive boxes or failing successive boxes would clearly be consistent with the hierarchical assumption, while failing one box and then passing another at a higher level would obviously be inconsistent with the hierarchy as defined. For those 15 boxes in Figure 9 that have subordinate boxes under them, the authors estimated that "confirming patterns" of pass/fail would occur by chance from 25 to 50 percent of the time; in the actual data collected the pass/fail pattern typically confirmed the hierarchical hypothesis in over 95 percent of the observations. Thus the hierarchy held to a striking degree.

The implication is that the learning hierarchy is the best way to describe the structure of the learning task. Gagné (1968) later took some pains to describe these boxes as intellectual skills rather than verbalized knowledge. The hierarchy defines the intellectual skills the individual needs to perform component tasks in a subject.

There are several other ways that the idea of hierarchy has been applied to theory of instruction. In the same context Gagné (1970) defines eight types of learning that range from simple to complex — the latter including the former. Typically, lower level skills in a hierarchy require simple types of learning, while higher level skills require more complex forms of learning. Bloom, Hastings, and Madaus (1971) follow a similar tack in defining six hierarchical levels of behavior that relate to the difficulty and complexity of the learning process. It is apparent that there is some correspondence between the two hierarchies though the former puts more emphasis on simple forms of learning.

8 types of learning (Gagné)	6 learning behaviors (Bloom et al.)
1. Signal learning	1. Knowledge of terms
2. Stimulus-response learning	2. Knowledge of facts
3. Chaining	3. Knowledge of rules and principles
4. Verbal association	4. Skill in using processes and procedures
5. Discrimination learning	5. Ability to make translations
6. Concept learning	6. Ability to make applications
7. Rule learning	
8. Problem solving	

Snow (1973) has already noted this type of hierarchical correspondence among hypothesized types of learning, learning tasks, and learning objectives. In general the notion of hierarchy is quite prominent in current thinking about instruction. The critical implication of hierarchy is that of ordered sequence. If the structure and process of instruction are faithfully represented by hierarchies, then the sequences within those hierarchies define how instruction should proceed.

ORDERED SEQUENCES

B. F. Skinner is probably more responsible than any other person for the current emphasis on sequence in instruction. His classical work before World War II on operant conditioning led to his influential writings on instructional technology (Skinner 1954) and the development of various forms of programmed instruction. In Skinner's work, sequence was important because he placed great importance on reinforcing the correct response in a step-by-step process of shaping behavior.

The ordered sequence of a learning hierarchy adds an important distinction because it implies that there is an optimum step-by-step process of learning a subject. The critical assumption is that there is positive transfer from lower to higher skills in a hierarchy; that is, learning a subordinate skill makes it easier to learn a superordinate skill than would otherwise be the case. Stating it another way, simple forms of learning transfer to more complex forms of learning; i.e., discriminations transfer to concepts, concepts transfer to rules, and so on (Gagné 1968). So a sequence within a hierarchy is a set of intellectual skills that are easier to master if learned in correct order. While it is possible to skip steps in the sequence, omission of critical skills could result in persistent confusion and retardation of a number of higher level skills.

As Gagné says, a learning hierarchy maps the appropriate learning route for most students. The implications for placement are important. With a valid hierarchical structure, it is simply a matter of determining how far the student's knowledge extends and beginning him at that point. If the hierarchical structure is not valid, one instructional sequence may be as good as another. It is likely that institutional practices often create hierarchies that have no real basis or necessity.

Validating a particular sequence turns out to be more complicated than it might seem. The consistent results cited in the case of the hierarchy depicted in Figure 9 could be due simply to the fact that some skills are more difficult, not that they necessarily afford any positive transfer from one level to another. A particular sequential order can be validated by experimentally demonstrating that learning does transfer from one task to another or by showing that one sequence is learned more easily than another. But for most practical purposes such demonstrations would be prohibitively costly and time consuming.

While the means of "proving" learning hierarchies are not completely satisfactory, most writers reviewing the research in this area seem in essential agreement (see Briggs 1968; Gagné 1973; Glaser and Resnick 1972). While research on learning hierarchies has been restricted largely to relatively short segments of instruction in mathematics and science, findings of a number of studies in those subjects suggest that there are often optimal sequences that result in easier mastery.

From one point of view one might say that this work on learning hierarchies oversimplifies instructional objectives and the learning process – particularly at the more advanced levels of education. Even with the best conceived hierarchy, students undoubtedly profit from holistic views of the sequence, learn skills through alternate sequences, etc. Nonetheless, the ideas of hierarchy and optimal sequence are implicit assumptions in the basic notion of prerequisite topics and courses. So in a sense this instructional theory is an elaboration of the old educational dictum that prerequisites must be mastered for effective learning. And "mastery" is another idea that has strongly influenced instructional theory.

MASTERY LEARNING

In education it has typically been assumed that some students are more able than others, that some will master the lessons placed before them, and that some will inevitably fail to learn. Carroll (1963) suggested some interesting relationships among several determinants of student achievement. His basic thesis was that a student will learn a given task to the extent that he spends the amount of time that he needs to learn the task. Three factors determine how much time the student needs: the quality of instruction, the student's ability to understand instruction, and the student's aptitude for learning this task. The two factors that determine time spent in learning are the time allowed and the perseverance of the student. While aptitude is relatively resistant to change, note that in this model aptitude is conceived as the amount of time it takes a student to learn a particular task rather than as a built-in restraint on his ability to master a subject.

The implications for educational and social strategy are obvious. With proper instruction and enough time, most students should be able to master most subjects. In the case of culturally disadvantaged students, a big question is how much time and resources will be provided. But the goal should be to insure that all students master each essential educational skill before giving up or moving stolidly on.

Bloom developed the idea of "learning for mastery" as a social goal and an instructional tactic (Bloom 1968 – also reprinted in a set of related papers edited by Block 1971). He advanced the hypothesis that 90 percent of all students can master quite well what there is to teach them. If education systems are to find ways to increase the proportion of students successfully completing secondary and higher education, Bloom suggested that they must invest more in the development of talent and less in the selection of talent.

The strategy of mastery learning requires close attention to the objectives of instruction and the standards to be attained.[3] When both are clearly defined in advance, both students and instructor work toward a common goal. In working toward each student's mastery of the subject, testing becomes a valuable tool and aid rather than a means of invidious comparison among students. This new emphasis in testing – called criterion referencing – is an inseparable part of much current instructional theory.

CRITERION-REFERENCED TESTING

While criterion referencing has roots that run in several directions, Glaser (1963) was the first to use the term and articulate some important characteristics of tests that should be emphasized when measurement is concerned with the outcomes of instruction. He offered this succinct definition: "A criterion referenced test is one that is deliberately constructed to yield measurements that are directly interpretable in terms of specified performance standards" (Glaser 1971). This means primarily two things. First, it requires careful tuning of a test and its subscores to the specific objectives of instruction. Second, it means that the test must be developed so that it discriminates well among those who do and do not surpass an absolute standard of performance (often minimum competency, though not necessarily).

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[3] See Lindvall 1972 for a useful review of six monographs on defining objectives.

The general purpose of such a test is to diagnose which segments of instruction a student has mastered. At lower grade levels this is likely to mean fairly specific short-term objectives like long division. At higher grade levels objectives worth measuring are likely to cover larger segments of learning. In either event criterion-referenced scores are directed to decisions that must be made—has the student mastered this skill, that course objective, and so on.

This means that a criterion-referenced test should provide diagnostic information that is especially relevant to placing students and monitoring their progress. As a corollary, such tests should readily discriminate students who have and have not gone through the relevant instruction (or perhaps discriminate those objectives that can be successfully taught). The important point is that tests designed to measure instructional outcomes should have these characteristics—and they are often not represented in current achievement tests.

Some writers, somewhat overenthusiastic, have suggested that criterion-referenced tests are a completely different form of measurement. It is important to remember that if any human standards are to have meaning they must, at some juncture, have normative reference. Absolute standards mean only that certain people are expected to meet them under certain conditions. Furthermore, any but the most trivial forms of achievement are mastered in degree rather than in all-or-none fashion. Thus good achievement tests must be criterion referenced as well as norm referenced in ways that will prove useful for instructional and decision-making purposes.

THE EVOLVING INSTRUCTION MODEL

These various ideas concerning learning hierarchies, ordered sequences, mastery learning, and criterion-referenced testing suggest a general approach to instruction that has gained considerable favor. There is no one instruction model, but several writers (e.g., Bloom 1968; Gagné 1970; Glaser 1970; Gougher 1971; Lindvall and Cox 1969) have outlined basic steps somewhat like the following.

1. Define course objectives or intended outcomes as clearly as possible, with emphasis on specific competencies students are expected to master.

2. Outline (in broad form or specific detail as appropriate) the structure of the subject so that skills and competencies are acquired in a logical order that maximizes positive transfer.

3. Set standards of mastery for each desired outcome of instruction – standards that are clearly measurable and not dependent only on relative standing of students.

4. Specify units of material, activities, and procedures by which students can master desired outcomes.

5. Develop or select measurement instruments referenced to the general objectives and specific competencies to be achieved.

6. Place students in a unit or course at the lowest sequential level that best represents competencies not yet attained.

7. Diagnose specific skills and competencies that the student has not acquired.

8. Prescribe instructional units relevant to skills and competencies to be learned next.

9. Monitor learning with performance tests referenced to intended outcomes on instructional units – in small or large steps as the nature of the material and the hierarchical structure dictate.

10. Recognize successful performance and move student to next unit or recycle through the same unit if mastery is not attained.

11. Continue this process with tests and instruction tracking one another until all units are mastered and the student demonstrates satisfactory competence in all objectives initially specified.

Of course there are wide variations from one instructional situation to another, but these are the ideal steps that would tend to be represented in a completely individualized instructional system. Or conversely, current ideas of individualized instruction are usually based on some or all of the steps outlined above. The following section includes discussion of applications as well as limitations of these principles.

INDIVIDUALIZED INSTRUCTION

In recent years individualized instruction has become a popular term and is frequently used to suggest a variety of educational innovations (for examples see Lange 1970; Beggs and Buffie 1965; Educational Testing Service 1965; Duane 1973). This is especially true in elementary and secondary education where, as Findley and Bryan (1971) suggest, the term has as many meanings as there are experts using it. Under the circumstances it would perhaps be futile to attempt any precise definition, but for purposes here it is useful to make two distinctions.

One distinction concerns the purpose of individualized instruction – whether it is intended to provide flexibility or control. Often instructional practices are referred to as individualized when the purpose is to provide additional flexibility to the student in meeting generally stated educational objectives. Examples include multiple options regarding educational media, resource materials, and activities; independent study; alternate ways to satisfy requirements; alternate syllabi to meet special interests, etc. These forms of individualization are certainly not unimportant, but following the rationale of Chapter 1 (see Figure 1), they closely resemble "elective options" – another general means by which higher education accommodates individual differences but a broad topic that lies beyond the scope of this report.

On the other hand, the instructional model outlined in the previous section is intended to provide better instructional control – specifically, control of the objectives, content, and sequence of instruction. It is through this control that one hopes to improve individualization by being better able to (1) tune the content of instruction to the acquired competencies of the individual, and (2) pace the rate of instruction to the learning rate of the student.

A second distinction concerns the level at which individualization occurs. At the micro level instructional technology (especially programmed instruction and computer-assisted instruction) is concerned with the moment-by-moment details of acquiring specific knowledge and skills. At an intermediate level, systems approaches to instruction organize small units within a course into learning sequences that can be effectively monitored and managed. At the macro level these forms of individualization merge into placement strategies that adapt an entire course or sequence of courses for groups of students at different levels of competency.

Before discussing this third, macro level and the main placement models it involves, it is useful to indicate very briefly the developments that have characterized the first two levels and to outline some educational and philosophical distinctions between these forms of individualization and the placement strategies that apply to groups of students.

INSTRUCTIONAL TECHNOLOGY

Saettler (1968) outlines the long history of instructional technology and indicates the wide variety of developments in this field. Audiovisual media are typically included under the heading of instructional technology, though they typically represent alternate means of presenting material rather than systematic, theory-based methods of instruction. The main systematic approaches are teaching machines, programmed instruction, and computer-assisted instruction (CAI)—all can be referred to as autoinstructional techniques.

The basic characteristic of the autoinstructional techniques is to lead the student step-by-step through a carefully constructed sequence of explanations and questions, recycling as necessary to insure that each essential idea is mastered before moving on. All such methods involve the development of a program that determines the exact content and sequence of material to be learned.

After a premature introduction (Pressey 1926), teaching machines burst into education in the late 1950s with the promise of highly efficient tutoring of students, thereby relieving teachers for the more creative interpersonal aspects of teaching. The teaching-machine bubble burst largely because it was overblown by manufacturers who found that it cost more to build the machines than schools were willing to pay. There were many complicating factors, including lack of good programs to use on the machines. Also teaching machines proved to be in an unhappy middle position. They lacked the portability of printed programmed materials, and they lacked the unbounded flexibility of the computer.

Consequently, in the late 1960s interest focused on programmed materials and computer-assisted instruction. The latter is widely assumed to have a very important future in education because of the power of this instructional medium in coping with individual differences. Not only is the computer able to branch in any direction, it can adapt the instructional approach to special aptitudes, interests, or cognitive styles of the student or recognize subtle cognitive errors that may run through different types of material. But these capabilities require exceedingly complex programming as well as extensive collateral research on the structure of individual subjects and how students acquire information generally. As most writers now acknowledge, applications of CAI are likely to be much slower than once hoped.

A standard reference on teaching machines and programmed learning is a book edited by Glaser (1965) for the Department of Audiovisual Instruction of the National Education Association. It includes chapters by outstanding authorities on such topics as instructional theory and objectives, programming research and techniques, programming in particular subject areas, and implementing programmed instruction. Another book edited by Holtzman (1970) is a valuable source of general information about CAI, and Suppes and Morningstar (1972) describe in some detail one of the most highly regarded CAI developmental programs in the country. Another useful general review of instructional technology is Klaus' (1969) book on instructional innovation and individualization. The effectiveness of various instructional media is reviewed in detail by Jamison, Suppes, and Wells (1974).

CLASSROOM APPLICATIONS

A systems approach to individualized instruction in the classroom uses the basic principles of instructional technology but applies them to somewhat larger units of subject matter. Saettler (1968) describes several surprisingly early programs of individualized instruction from about 1920. The so-called Winnetka Plan was influential in that period. It illustrates three essential ingredients: units of instruction that correspond to specific course objectives and may extend from one lesson to several weeks, self-instructional materials that allow students to advance at their own pace, and systematic testing to determine whether students have mastered successive units. Kersh (1965) speculates that more schools are finally shifting to this type of plan because of a renewed emphasis on subject matter and the availability of better self-instructional materials and tests.

Various innovators have rediscovered the Winnetka Plan or added to it over the past half century, but only in the past decade has there been substantial interest in the systems approach to individualized instruction. In 1968 Keller described a widely imitated Personalized System of Instruction (PSI) for college-level courses. The Keller plan emphasizes self-instructional programmed materials, self-pacing, unit mastery before advancing, and extensive use of proctors for frequent testing, immediate scoring, and personal monitoring and tutoring. Generally similar programs in chemistry, physics, statistics, psychology, electronics, and history are described by Hunter (1973), Elliott (1973), Myers (1970), Nazzaro et al. (1972), Morris (1973), and Woodbury (1971).

Kulik, Kulik, and Carmichael (1974) reviewed a number of evaluations of the PSI approach in science courses. They concluded that the Keller plan is attractive to most students, the students work harder, feel that they learn more, and do usually make higher scores on content examinations than students in regular sections.[4] Gougher (1971) outlines a number of such programs in foreign-language instruction that place special emphasis on the use of instructional technology. Finally, Johnson and Johnson (1970) and Roueche and Pitman (1972) describe simplified general purpose approaches that have been used experimentally in community colleges. Some community colleges have also used small units of material to allow students to construct their own courses (Lowell 1972; Ohlemeier 1972).

The most extensive efforts to develop a systems approach to individualized instruction have been in elementary and secondary education. Briggs (1970) provides an excellent general description; an especially noteworthy application has become known as Individually Prescribed Instruction (Glaser 1968; Lindvall and Cox 1969; Lindvall, Cox, and Bolvin 1970). Initial work on the IPI project involved the identification of 430 specific instructional objectives in elementary mathematics for grades K-6. Instructional materials prepared for these objectives were grouped into 88 units arranged in hierarchical order. An essential feature of the program is the removal of grade boundaries and arbitrary time limits so that students can move at their own pace. Since students master each unit in turn, progress is measured by the number of units completed.

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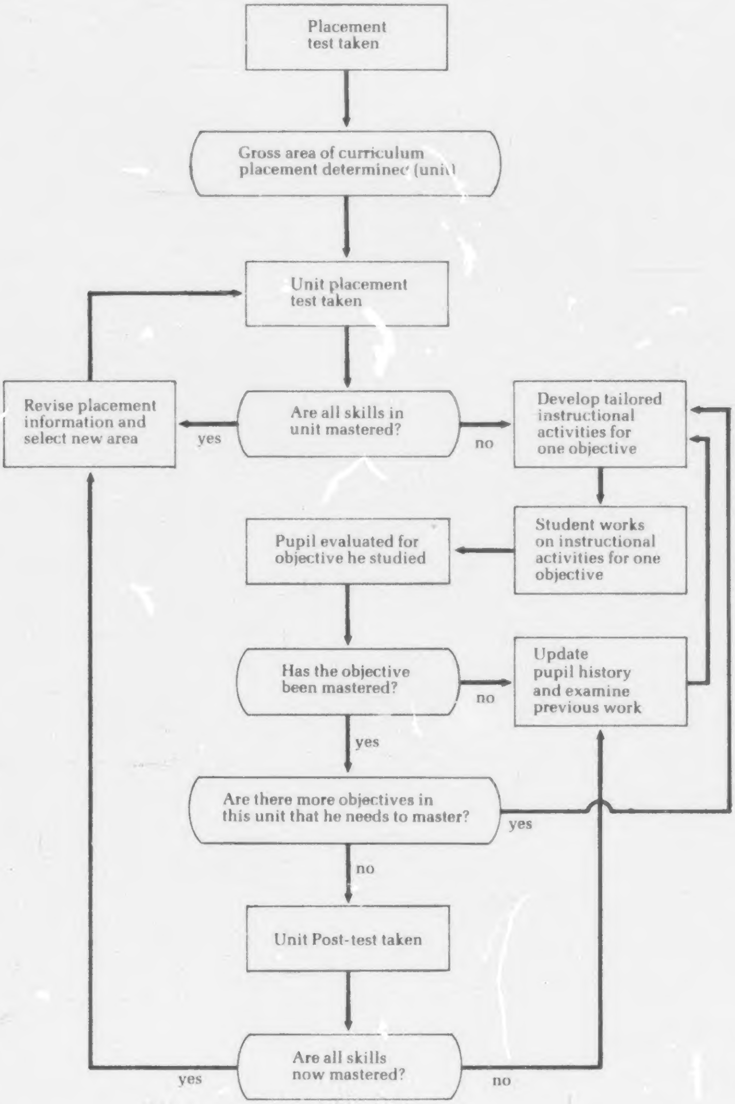
[4] Evidently the Keller plan and similar methods of "modularizing" a course are equally popular with faculty. Kulik et al. report that over 800 such courses have been developed in psychology alone. A national Center for Personalized Instruction was established at Georgetown University in 1973 to foster this movement. See Diamond et al. (1973) for an excellent example of a university center that supports the development of individualized courses within departments.

In this systems approach testing and instruction are inseparable aspects of the same process, not separate activities. For each unit there is a pre-test and a post-test in essentially parallel form. For each objective there is a "curriculum-embedded" mastery test. Figure 10 illustrates the systematic manner in which students move through the successive units with full understanding of goals, performance on particular objectives and units, and progress in the course. This system illustrates quite well the basic steps in the instructional model discussed earlier.

As Cooley and Glaser (1969) have discussed, one of the most demanding aspects of individually prescribed instruction is monitoring the independently paced activities of a number of students simultaneously. In the IPI program this is largely a computer operation that stores and retrieves detailed information on the learning and testing history of each student, signals decision points for the teacher, summarizes information relevant to instructional decisions, and suggests possible assignments for further work. In other words the computer plays a critical supporting role in managing the instructional system.

Project PLAN (Flanagan 1971) is another comprehensive systems approach that makes heavy use of the computer for instructional management. PLAN is a more ambitious activity including instruction in language arts, social studies, science, and mathematics in grades K-12. PLAN also places considerable emphasis on educational and career development. it incorporates routine reports that evaluate the student's progress and coursework in relation to the implicit requirements of previously stated plans. Accordingly, the

FIGURE 10: Instructional process flowchart for the IPI procedure (Adapted from Glaser and Nitko 1971)


Placement test taken
Gross area of curriculum placement determined (unit)
Unit placement test taken
Revise placement information and select new area
yes
Are all skills in unit mastered?
no
Develop tailored instructional activities for one objective
Pupil evaluated for objective he studied
Student works on instructional activities for one objective
Has the objective been mastered?
no
Update pupil history and examine previous work
yes
Are there more objectives in this unit that he needs to master?
yes
no
Unit Post-test taken
yes
Are all skills now mastered?
no

student may receive signals suggesting additional work in certain areas, deficiencies that must be removed, alternate plans that might be considered, and so on.

These various applications make it clear that adjusting instruction to individual differences occurs at two stages. In framing the scope of this discussion in Chapter 1 (see Figure 1), two stages were distinguished: (1) grouping procedures for adapting to individual differences, and (2) various forms of individualization that can occur within groups. These two stages appear formally in the IPI procedure shown in Figure 10. Students are first placed at an appropriate level in the curriculum, and instruction is then individually prescribed on the basis of individual competencies. This procedure may require two stages of testing: placement and diagnostic. This report is primarily concerned with the former. Whether students also need to be routed to a second, diagnostic stage of testing depends on the level of individualization anticipated. Five levels can be distinguished:

1. No individualization – uniform pace, lectures, etc. for all students.

2. Traditional efforts to identify and correct weaknesses of individual students through informal conferences, special assignments, etc.

3. Placement of students into alternate groups depending on level of competency in the subject matter. This type of individualization may be enhanced by (4) or (5) below.

4. Special diagnosis and prescription of work units to meet specific course objectives (e.g., Keller plan).

5. Restructuring of entire course sequence so that each student proceeds completely independently of others (IPI, PLAN).

Each of these five levels of individualization obviously includes each level above it. For example, in a modularized course the first step would be to give students credit for modules already mastered – i.e., place them at an appropriate point in the internal sequence of the course. How far it is advisable or possible to go with the more structured forms of individualization depends on the peculiarities of the subject, the objectives of the course, and the limitations of the approach generally.

LIMITATIONS

There are obvious limitations in the extent to which the micro and systems approach to individualized instruction is applicable to higher education. There are philosophical objections that center especially on educational technology (e.g., Thelen 1963; Epperson and Schmuck 1969). And there are practical problems related to the nature and structure of higher education (see especially Ebel 1972b; Steiner 1970).

Critics of educational technology and individualized instruction question the whole process of setting specific behavioral goals and designating particular subject matter to be acquired in fulfillment of those goals. Such an assumption, it is argued, implies a stable truth that has only to be defined by some elite expert. A more tangible problem is the fact that instructional goals in higher education typically refer to larger blocks of a subject and often cannot be easily sorted into an optimal sequence and compartmentalized in the small packages with which individualized instruction best deals. Stated another way, education is not the same as training; it requires a broader philosophical rationale than successful acquisition of a specific narrow competency or limited skill.

Other criticisms center on the matter of student participation. Programmed instruction is often viewed as an isolated activity that provides insufficient opportunity for the student to learn how to learn, learn through socialization, participate in goal setting, and imagine new uses of knowledge. Similar objections can be directed to any self-contained instructional system not especially responsive to the unexpected. Some have made the point that individualized instruction is, in fact, quite standardized in important respects. And there are other realities; the more elaborate approaches to individualization can be quite expensive (Gougher 1971).

These shortcomings are perhaps overstated, especially when juxtaposed with the too frequent failure of students to learn the bare essentials of a course—essentials that may be necessary to understand the next course. The most effective compromise may be improved methods of placing students according to competency in broadly structured units of instruction. If this first stage of adjusting to individual differences is handled well, there is less need for the second. A tradition of grouping students through placement is thoroughly embedded in current practices, facilities, and curriculum. The developments in instructional theory suggest how the tactics of such placement can be improved.

From this point there are three useful ways to discuss placement: (1) general placement tactics, (2) placement in subject fields, and (3) types of applications (models). To avoid redundancy these must be taken up one by one, even though each is best understood after discussion of the other two. So the next concern here is how the instructional model just outlined can be joined with decision theory to suggest sound placement tactics.

PLACEMENT TACTICS

The model of individualized instruction just described tends to create its own curriculum structure through the development of sequences of units. In fact, the application of instructional technology and a systems approach to instruction more or less necessitate breaking down the boundaries of conventional college courses (Cooley and Glaser 1969). But it can be assumed that most colleges, for good reasons already stated, will maintain existing course structures in large part for the foreseeable future. In any event, interest here is in how to place students into groups for most effective instruction.

The problem then is to take the useful ideas from individualized instruction and apply them to group adaptations to individual differences within the existing context of higher education. So we next have to look at the existing structure, particularly with respect to the types of placement decisions colleges typically make, the nature of course sequences, and how those sequences vary from one subject to another.

TYPES OF DECISIONS

Since there are various ways in which colleges group students in order to adapt to individual differences, there are myriad decisions that might be made with respect to any particular student. This is especially true of entering students who arrive with mixed backgrounds. Various terms are applied loosely to this decision-making, but placement is probably the most common. In the framework developed here (see Table 2) placement has a fairly explicit meaning. Consequently this is a convenient place to look at the sorts of decisions that might be involved in developing a student's program, and distinguishing which of those decisions are, for purposes of this report, placement decisions.

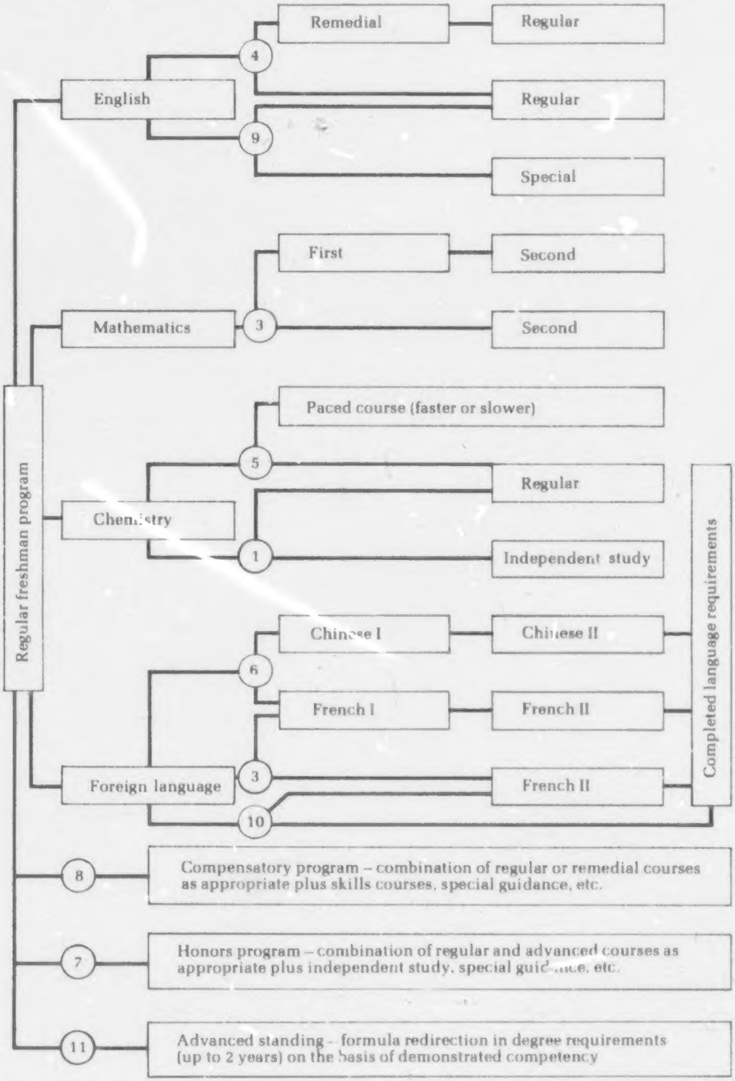
It is important to recognize that reference is made here to decisions that hinge on individual differences in learning capability or acquired competencies. This discussion does not include decisions concerning career goals, degree plans, or optional courses that reflect individual differences in aspirations and interests. In Chapter 1 such decisions were termed "elective options"—an important but quite different means of adjusting higher education to individual differences.

With that significant qualification, Figure 11 illustrates alternate treatment models as a series of decisions in the educational guidance of an entering student who faces broad program options as well as a number of more specific options with respect to individual courses. This prototype arbitrarily includes four courses in the "regular" curriculum. At each decision point the circled number indicates which alternate treatment model (from Table 2) is applicable. The particular models illustrated for each course are somewhat arbitrary; in general, most of the models are applicable to any course.

The first decision one might normally consider is whether the student is eligible for advanced standing (Model 11). Other general decisions with broad program implications are whether the student should follow some special program—for example, an honors (7) or compensatory program (8). Assuming the student follows the regular program, a number of decisions might apply to individual courses.

In English two possible decisions are illustrated. One is whether the student should be placed in a remedial or regular course (4). Another is whether the student should be exempted from the regular course on the basis of demonstrated competency and moved over to an alternate course (perhaps designated "honors") that might include a good deal of enrichment or constitute a different course altogether. In either event this latter decision does not, in this context, involve placement because there is no common sub-

FIGURE 11: Illustration of alternate treatment models as a series of decisions that might be made concerning the program of an entering student (Circled numbers refer to models)


Regular freshman program
English
4
Remedial
Regular
Regular
9
Special
Mathematics
3
First
Second
Second
Chemistry
5
Paced course (faster or slower)
Regular
1
Independent study
Foreign language
6
Chinese I
Chinese II
French I
French II
3
French II
10
Completed language requirements
8
Compensatory program – combination of regular or remedial courses as appropriate plus skills courses, special guidance, etc.
7
Honors program – combination of regular and advanced courses as appropriate plus independent study, special guidance, etc.
11
Advanced standing – formula redirection in degree requirements (up to 2 years) on the basis of demonstrated competency

ject-matter criterion to evaluate the outcome of the two treatments (see Model 9).

The decision indicated in mathematics is a placement decision (3). Even though students are placed in different courses, the second course in the sequence provides a common criterion to evaluate the outcome of the alternate treatments. Similarly, in chemistry the decision to put a student in a regular course or one that is faster or slower is also a placement decision (5) because students at different initial levels of competency end up completing the same subject matter. The second pair of alternatives in chemistry also involves putting students in alternate sections of the same course, but in this case the two treatments involve a variation in teaching methods (1), and students are assigned on the basis of learning capability rather than placed according to acquired competency.

Three types of decisions are illustrated in the case of foreign language: the same sort of placement decision (3) as in mathematics, and two others. The placement decision involves placing the student somewhere *within* the French sequence. If the student is given credit for the language requirement and takes no more French, then there is an exemption decision (10) that differs from the placement decision primarily in the lack of any common achievement criterion following the exemption/no exemption alternatives. French II provides that common subsequent criterion to evaluate the placement decisions represented by (3).

The choice between French and Chinese is a rather different situation. Model 6 refers to selective sectioning. In this illustration this means that the faculty regards Chinese as a very difficult course and admits only students who have sufficient demonstrated aptitude to handle the course satisfactorily. If admission to the course in Chinese were not selective, the choice between French and Chinese would reduce to an elective option and would not be of concern here.

Figure 11 illustrates the variety of decisions that might be involved in constructing one student's program and helps to distinguish the particular placement decisions covered in this chapter from somewhat similar models discussed in other chapters. The common characteristic of the three placement models is that each involves placing students *within* a course sequence. Students placed in alternate treatments reach a common end-of-sequence criterion in different amounts of time—either because they entered at different points (as in vertical sectioning or remediation) or because they proceeded at different rates (as in paced instruction). So placement always involves a decision regarding a short sequence versus a long sequence. The rationale for effective placement must, therefore, revolve around the question of how to identify those individuals who ought to go through the shorter or longer sequence.

THE TTI RATIONALE IN PLACEMENT

Going back to the decision theory of Chapter 2, the rationale for effective placement is encompassed in the notion of the trait-treatment interaction (TTI). Any time different students are placed in different treatments in order to facilitate optimal achievement, there is an implicit assumption that the trait and the treatment interact, and the usefulness of the whole placement procedure rests on that assumption. Figure 12 illustrates the TTI assumption.

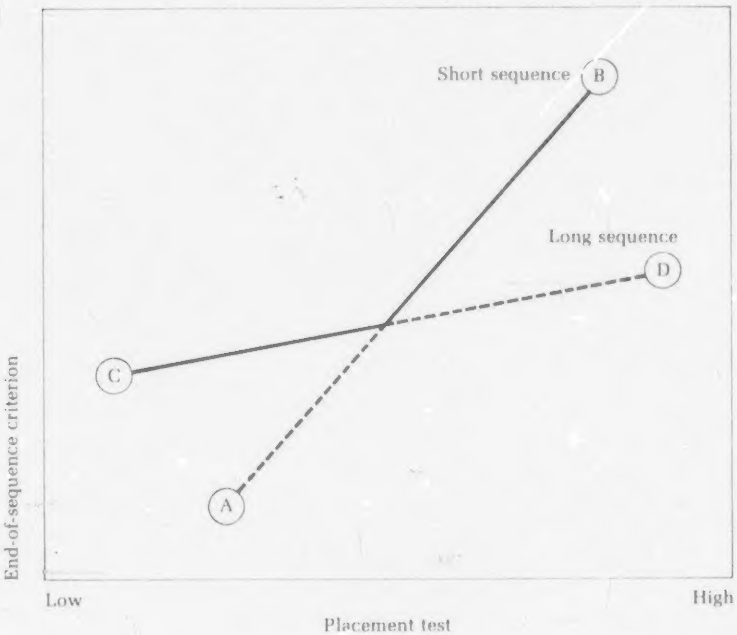
The regression lines indicate what level of criterion achievement can be expected of students who score at different levels on the placement test. Line A-B shows that relationship for students who go through a short sequence; line C-D shows the relationship for students who go through the long sequence. The figure indicates that students who score low on the placement test ought to be placed in the longer sequence and students who score high ought to be placed in the shorter sequence. This procedure places students in treatments so that the achievement level of the total group is indicated by the solid portions of the lines. Thus the good and the poor students both achieve at a higher level than would be expected if all went through a common sequence of intermediate length.

The figure makes explicit the fact that the regression lines have to cross if the placement procedure is to result in greater overall achievement. It also makes explicit the fact that under these circumstances differential placement is necessary if instruction is to be effective for students at low and high levels of competency (also see Figures 2 to 4 and accompanying discussion).

Now the question is what sort of placement test and what sort of sequences are likely to produce this TTI? Instructional theory described in the first part of this chapter seems to provide the best answer to that question. The instructional model of Gagné, Glaser and others lays great stress on the importance of students' mastering all the successive segments of an ordered instructional sequence. For most students it is difficult to skip over material or to make normal progress when there are critical holes in prior preparation. So the effective placement tactic should be to find out where the student is in the instructional sequence and then prescribe accordingly.

This tactic implies an emphasis not only on what the student knows, but also on the nature of the alternate instructional treatments. Notice what is likely to happen in Figure 12 when the placement test and the instructional treatments are carefully tuned, one to the other. Students who demonstrate poor preparation on a

FIGURE 12: Illustration of the TTI assumption in the case of placement



placement test will profit from a longer instructional sequence if it teaches them what they need to know. If the placement test indicates that they already know the extra material of the longer sequence, then that treatment is likely to result in boredom, poor study habits, and so on. On the other hand the shorter sequence assumes that students know the material in the test, so success in that sequence is very dependent on a high placement score. If the placement test is properly tuned to measure the different achievement levels of the shorter and longer sequences, one regression line should be steep and the other flat – producing the essential TTI of an effective placement procedure. One further implication is that effective placement procedures depend on the nature of the instructional sequence. As one might suspect from the diversity of subject matter in higher education, there are important variations among different course sequences.

TYPES OF COURSE SEQUENCES

College catalogs ordinarily make two distinctions in specifying course series. One is whether one course is prerequisite to another; e.g., the student must take Mathematics 104 before Physics 201. Another usual distinction is whether two or more courses form a numbered series in a particular subject area; e.g., Psychology 101, 102, etc. These distinctions are fine for curriculum construction and educational bookkeeping, but neither is especially useful for the purposes of this report.

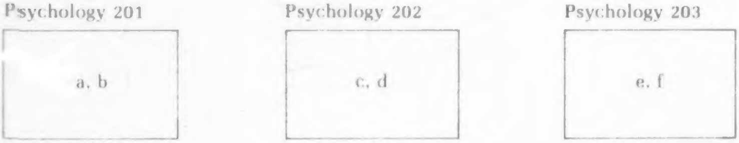
Such distinctions are unreliable in considering placement strategies because they do not necessarily indicate any particular functional relationship between successive courses. A numbered series may imply nothing more than administrative convenience, and a prerequisite series does not always mean that there is any substantial amount of positive transfer from the first to the second course. In fact, a favorite traditional topic of faculty conversation is whether some particular prerequisite requirement can be justified.

Figure 13 illustrates three types of relationships among successive courses. Each type has different implications for sorting students into alternate treatments. The ordered series consists of courses normally taken in a particular order, but the content of the courses (a, b, c, etc.) is largely nonoverlapping. For example, Psychology 201 may be prerequisite to Psychology 202 and it may be desirable to take them in that order, but success in the second course is not critically dependent on having taken the first. That is, with extra work or by concentrating on certain aspects of Psychology 202, a student may be able to compensate for not having had Psychology 201.

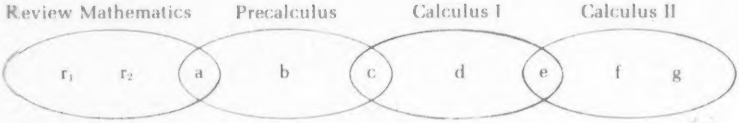
The important thing about the ordered series is that the successive courses are not enough dependent, one on the other, to form a sequence in the sense the term is used here. In general, this means that Psychology 203 is an insensitive criterion for evaluating alternate treatments at earlier stages in the series. Lacking such a criterion, a more appropriate approach to exempting part or all of the courses in an ordered series is Model 10.

In a segmented sequence, however, there is an important degree

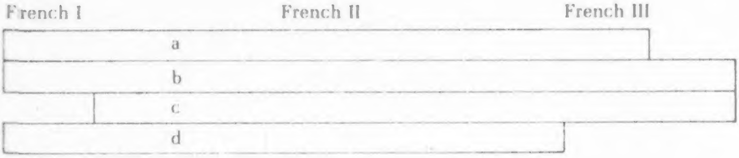
Figure 13: Three types of relationships among successive courses (content represented by a, b, c, etc.)


Psychology 201
a, b
Psychology 202
c, d
Psychology 203
e, f

Ordered series


Review Mathematics
r_1
r_2
a
Precalculus
b
c
Calculus I
d
e
Calculus II
f
g

Segmented sequence


French I
French II
French III
a
b
c
d

Homogeneous sequence

of overlap and mutual dependence between successive courses. The segmented sequence illustrated in Figure 13 includes a remedial course followed by regular mathematics courses. The content of precalculus is represented by a, b, and c. In this paradigm, a, c, and e represent critical knowledge and skills that link the sequence. More specifically, the competencies implied by c are essential for successful performance in calculus, but formal instruction in those competencies may occur largely in pre-calculus. This segmented sequence displays a hierarchical structure at a macro level and represents the relationship typically assumed in most closely linked prerequisite courses.

A more specialized type of closely linked course sequence is represented by the homogeneous sequence shown in Figure 13. In this sequence, bands a, b, c, and d represent particular skills and types of content that run through several successive courses: French I, II, III. The homogeneous sequence tends to characterize foreign-language instruction where the same skills are emphasized in French II as in French I (e.g., vocabulary, grammar, oral expression, etc.). Hierarchical structures are represented within these bands, but at the macro level this type of sequence is not characterized by discrete skills or packages of content that are taken up and mastered in successive courses. The segmented sequence does have that hierarchical characteristic and is especially evident in closely linked courses in mathematics and science which tend to be highly structured. Another useful way to distinguish the two is to ask what a student knows when he has proceeded part way through each. In the segmented sequence he perhaps knows a and b but not c and d. In the homogeneous sequence he knows a, b, c, and d to a certain extent.

THE NATURE OF A VALID PLACEMENT TEST

Having established the connection between decision theory and instructional theory, and having distinguished two types of course sequences within which placement operates, it is now possible to draw more specific conclusions regarding the sort of placement tests that are likely to prove most effective and how such tests are best validated. The following considerations tend to apply to placement generally, though some qualifications are mentioned as the individual models are discussed in the following sections.

Of the two types of sequences, placement is simpler in the homogeneous sequence because test subscores do not need to correspond to particular segments of the sequence. The basic requirement is to use a placement test that represents appropriately the various skills and types of content that run through the sequence so that student competency can be accurately matched with course level. This is typically what is done in language placement, and there is relatively little complication concerning the content of the test. In such placement a primary question is how cutting scores should be set for vertical sectioning (see Model 3).

Placement is more often applied within sequences that are assumed to be segmented. As already noted, most current instructional theory assumes that most subject matter can be organized as a segmented sequence of topics, and that learning is most effective when instruction is so organized. Furthermore, placement within the segmented sequence is more complicated and subject to abuse. Consequently it is the more interesting of the two types of sequences and the more fruitful to examine.

All the previous discussion of instructional theory and decision theory suggests that one simple working tactic is most likely to produce a trait-treatment interaction – i.e., effective differential placement. That tactic is to place the student in the instructional sequence just ahead of what he knows, or conversely, move him back as necessary to pick up essential material that has not been mastered adequately. It is obvious that the content of the test must be carefully referenced to the decision involved. If the decision is whether to place a student in precalculus or calculus (see Figure 13) then the test must cover the content of the precalculus course (a, b, c).

The segmented sequence in Figure 13 includes a remedial course, since there often is the question of whether incoming freshmen are well enough prepared to enter the first course in a given sequence – particularly in basic courses like mathematics and English. There are enough unique educational and administrative issues regarding remedial work to warrant treating it as a special form of placement (Model 4), but for many purposes it is useful to note that placement out of remedial is comparable to placement out of precalculus or placement out of calculus.

So actually there is a series of basically comparable placement decisions within the sequence: whether to place students in remedial or precalculus, in precalculus or calculus, and in Calculus I or Calculus II. While placement is actually a matter of moving students forward or backward from the "normal" point of entry in a sequence, it is useful to think of the series of decision points as each involving the question of whether the student should be moved forward or not. Then the optimal test for each decision point is a test tailored to the content of the preceding course. The obvious implication is that an effective placement test for a segmented sequence must have appropriate part-scores relevant to the content at different levels if the test is to be used with maximum effectiveness at more than one decision point.

How does one establish that a placement test is effective for the purpose – that is to say, valid for placement? The foregoing suggests that there are basically two methods: (1) demonstrating a TTI or (2) establishing content validity. It should come as no surprise that the first is the recommended method but also the most difficult and the least likely to be employed in actual practice. In fact, published instances are quite rare.

To validate a placement test by demonstrating a TTI, one would proceed along the lines suggested in Chapter 2. If the placement decision point involved precalculus and calculus, a test including content a, b, c would be administered before instruction to two groups: to one group that subsequently took precalculus followed by calculus and to another group that went directly into calculus. For each group separately, the test would be correlated with final achievement in calculus. Evidence that the test is valid for making placement decisions at that particular point in the sequence would be based on finding differential regression (prediction) for the two groups (like that shown in Figure 12).[5]

[5] As a refinement it may be that the best possible placement measure might result from weighting a, b, and c for maximum multiple correlation with final calculus achievement for those taking the short sequence. This procedure might be optimal not because it yields a higher correlation between the test and a criterion but because it produces the particular type of placement score that is most likely to identify students who will be differentially affected by placement at one level or the other. Thus, students scoring high (with such a weighted score) would do well in an advanced section, while those scoring low would be the best candidates for achieving mastery if put in a section where they could correct their deficiencies. The effect would be a steep regression line for the short sequence treatment and a flat line for the long sequence treatment – i.e., an effective TTI.

The more practical method of validating a placement test (for the same precalculus vs. calculus decision) would be to establish its content validity. The usual and essential way of doing that is to examine the test and compare its content with the precalculus course. Another approach to content validity would be to correlate scores on the test with final achievement in precalculus for students who have just taken the course (often called concurrent validity). A high correlation suggests useful correspondence (if verified by content analysis) though a modest correlation could simply mean that the course grades are unreliable, or based on extraneous considerations like whether the student attended classes regularly or handed in reports on time. Note that a predictive correlation between precalculus achievement and a test administered before the precalculus course does not, in and of itself, establish content validity or any sort of placement validity.

The basic point is that the placement measure needs to be a good indicator of whether the student knows the material covered in the precalculus course. The best way to determine that is to look at the placement measure. All this seems straightforward enough, but it belies common practices and assumptions. Hills (1971) refers to the conventional approach to placement and questions its usefulness. It is doubtful that any writer has articulated a conventional approach in any detail, but in most course sequences (other than foreign languages) it might be described as follows.

Most incoming freshmen take the regular Course A in a particular sequence, though the faculty recognizes that the regular course is repetitive for some students and too difficult for others. So an achievement test that seems to be generally relevant is used to predict grades in Course A. And in order to get improved prediction, other measures like high school rank in class or admissions test scores may be used to compute a multiple correlation. Predictions thus derived are used to identify the most able students to take an advanced course while the least able are placed in a remedial section. There are several shortcomings to this routine application of the prediction model.

First, it does not establish validity of the placement test in any of the senses discussed above. Second, it attempts to employ the same placement variable for decisions at two levels even though the necessary information is usually different. Third, the general approach, especially the use of multiple correlation, lays primary stress on achieving high correlations even though various writers (see Chapter 2) have emphasized that correlational level is not a critical consideration in placement. Fourth, the tendency to use general ability measures reduces the likelihood of identifying those particular students who are deficient or advanced in specific subject matter and can profit most from differential placement. Use of multiple measures merely to heighten a correlation probably reduces such discriminating value by converting the placement variable to a measure of general ability rather than specific knowledge and skills represented in the course. Fifth, when a placement test is not a fair measure of the knowledge and skills represented in a course, the test is a less defensible basis for waiving that particular course requirement for degree purposes.

These various shortcomings of a conventional prediction approach underline the fact that placement is basically an instructional strategy. Consequently, placement procedures must be primarily concerned with what students know, what instructional alternatives they should follow, and what outcomes of alternate treatments there are. The foregoing discussion has been concerned with how to get a valid measure of what students know. In the following discussion of placement in subject fields, it is apparent that the problem varies across disciplines.

PLACEMENT IN SUBJECT FIELDS

Up to now this chapter has been concerned with principles that are generally applicable to placement. Every specific instance of placement will differ somewhat depending on the particular course involved. Within the limited scope of this report it is obviously not possible to take up detailed substantive considerations in different courses, but it is desirable to comment briefly on some general ways in which placement varies across broad subject fields. In so doing there is little point in trying to cover here the relevant research in subject fields – partly because there has been limited research that is especially pertinent to particular subjects, and partly because most of the studies that might be mentioned are discussed in some other context. But Table 3 summarizes a number of reports that pertain to placement in mathematics, science, foreign languages, and English. Most of these reports are empirical placement studies, but in order to provide a more useful reference to work in these subject fields, there are also included a few general discussions of placement in the fields indicated and a few selected references on individualized instruction.

Mathematics and science. The problems of placement in mathematics and science are generally similar. The subject matter tends to be highly structured, and this structure is reflected in fairly clear hierarchical sequences of courses (e.g., see Mathematical Association of America 1972). Course sequences are usually segmented in the sense that success in one is definitely dependent on satisfactory performance in a prerequisite. At the same time both mathematics and the sciences provide an assortment of specialized service courses that do not necessarily fall within a prescribed sequence.

One apparent difference in mathematics and science instruction at the freshman level is a tradition of starting students in mathematics at several levels, while a freshman science course is more likely to begin at the beginning regardless of whether incoming students have had any work in the area or not. This is perhaps related (as cause or effect) to the fact that mathematics instruction has moved more definitely to the identification of instructional modules covering specific topics. In discussions of remediation and paced instruction, there are illustrations of how this development has encouraged the sorts of placement procedures described here.

The basic similarity of placement in mathematics and science is exemplified by a pair of interesting studies—one in chemistry by Reiner (1971) and one in mathematics by Ahmann and Glock (1959). Neither was regarded as especially successful but apparently for different reasons. The latter study placed great emphasis on determining the specific mathematical skills required in subsequent courses and developing a placement test and instructional alternatives tuned to those skills. Students selected for the experimental mathematics course demonstrated improvement in the specified skills, and in the opinion of students and faculty the course was a success. On the other hand students who took the experimental course did not make better grades in subsequent courses (mostly science) than did a control group. That sort of result is puzzling and discouraging, but it may well have resulted from the lack of a reliable criterion of mathematics achievement. Grades in individual science courses are not completely reliable and only partly dependent on competency in mathematics. Students with deficient mathematical skills might have compensated by working harder on other aspects of the science course.

TABLE 3: References to reports concerning placement in particular subject fields

MATHEMATICS:

Ablon 1972
Ahmann and Glock 1959
Burnham and Hewitt 1971
Buzard 1973
Clark 1973
Dunn 1966
Elbrink 1973
Feldman and Kane 1973
Ford 1970
Francis 1966
Fry 1973
Glaser 1968
Haven 1971
Johnson et al. 1968
Lindvall and Cox 1969
Lindvall, Cox, and Bolvin 1970
Mader 1971
Mader 1972
Michael and Michael 1969
Nazzaro et al. 1972
Ohlemeier 1972
Reilly 1970
Riner and Waits, 1973
Roueche 1967
Roueche 1968
Sharon 1970
Shevel and Whitney 1969
Suppes and Morningstar 1972
Trismen and Barrows 1970
Waits 1973

SCIENCE:

Bohensky 1968
Elliott 1973
Feldman and Kane 1973
Hunter 1973
Johnson et al. 1968
Keller 1968
Lowell 1971-72
Mitchell 1973
Moore et al. 1973
Morris 1973
Myers 1970
Reiner 1971
Trismen and Barrows 1970
Willingham 1961

The study in chemistry was almost the opposite situation. The first course in a chemistry sequence was waived for some students but not others. The effectiveness of this vertical sectioning was evaluated with a highly reliable composite criterion of six subsequent chemistry courses. From the results it was apparent that poor students did better in subsequent work if they took the first course, but it was only the very best students who could skip the first

FOREIGN LANGUAGE:

Aleamoni 1973
Aleamoni and Spencer 1968
Beanblossom 1970
Beanblossom 1970b
Bosworth and Benamou 1968
Burnham and Hewitt 1971
Carroll 1962
Clark 1971
Davis 1969
Davis 1969b
Dizney and Gromen 1967
Flaugher and Spencer 1967
Gallagher and Spencer 1964
Gougher 1971
Hagiwara 1968
Kelley 1973
Kyes 1968
Lange 1970
Politzer 1971
Spencer and Flaugher 1967
Steiner 1970
Svobodny 1971
Valette 1968

ENGLISH:

Alford 1973
Becker 1973
Bossone 1966
Burnham and Hewitt 1971
Carlson 1969
Casterline 1973
Clark 1973
Daly and Stahmann 1968
Ford 1970
Haven 1971
Ivens 1972
Johnson 1972
Johnson et al. 1968
Kelley 1973
Losak 1972
Mayer 1973
Peck and Brinkley 1970
Reilly 1970
Roueche 1967
Roueche 1968
Sharon 1970
Shugrue 1970
Sweet and Nuttall 1971
Trismen and Barrows 1970
Wilcox 1972

course and do satisfactorily in later work. One is inclined to agree with the author's expectation that there would be more difference between the two treatments. The chief weakness of the study seems to lie in the definition of the experimental placement variable. In this case it was a combination of mathematics achievement and rank in high school class rather than competency in chemistry—the course that was waived.

Foreign languages. Unlike the segmented curriculum sequences common in mathematics and science, foreign-language instruction is characterized by a homogeneous sequence of courses, at least through the elementary and intermediate phases of learning the language. As discussed earlier, a homogeneous sequence implies that generally similar objectives and content run through successive courses. For example, common objectives such as vocabulary knowledge, grammar knowledge, translation into English, translation into the second language, etc. (see Steiner 1970) are developed jointly through time rather than being acquired one after another.

This interpretation of the foreign-language curriculum is supported by the fact that the notion of level is a key concept. Each curriculum level represents a specific amount of material, and the level concept has long played a central role in articulation of language instruction between secondary and higher education (Politzer 1971). The traditional rule of thumb has been "one year in high school equals one semester in college." This idea has always been beset with problems, and recent studies show some of the reasons why the rule is so frequently unreliable (Flaugher and Spencer 1967; Spencer and Flaugher 1967: Aleamoni and Spencer 1968).

In particular, instructional programs vary from one high school to another, grades are not a reliable indicator of achievement level, students take a language for varying periods at different times in high school, and different amounts of time elapse between language instruction in secondary and higher education. Because of these ambiguities it is generally agreed that some standard measure of competency is necessary in order to place students with reasonable accuracy. There are a number of examinations available for this purpose, and the profession has given considerable attention to foreign-language testing (e.g., see Clark 1971; Valette 1968).

Because the type of content does not vary radically from course to course, the principal need is to estimate the student's general competency in the language. Consequently, a single test is generally adequate for placement purposes, assuming it adequately represents the instructional content and objectives. Mainly to insure adequate representation, the College Board language Achievement Tests (probably the most widely used for college placement) added a subscore for listening. From the standpoint of concurrent validity, however, recent evidence indicates that the traditional reading score of these tests correlates quite well with course grades (.55-.65) as compared to placement tests generally (Kelley 1973; Aleamoni 1973), and the listening score is much less closely related to estimates of classroom performance. It may be that the two scores are differentially useful in different institutions.

There has been more professional interest in individualized instruction and placement in foreign language than perhaps any other subject field. Individualized instruction was the central theme for volume two of the *Britannica Review of Foreign Language Instruction* (Lange 1970; see also Politzer 1971; Gougher 1971). This interest has been reflected in detailed discussions of course objectives, mastery learning, and criterion-referenced testing (Steiner 1970; Valette 1968). As a result language teachers have shown a good deal of interest in assessing different competencies in learning a second language. A critical problem with subscores in a homogeneous area like language instruction is the fact that the subscores often correlate very highly with one another. As a result, it is seldom that a student's subscores are enough different to be of any significance to him or the instructor. It may be that short criterion-referenced scales would be of value for monitoring and pacing the learning of individual students, but such scales must be directly articulated with instructional materials to have much value. This is referred to earlier as second stage, diagnostic testing as opposed to the first stage, placement testing with which this chapter is here primarily concerned.

English. Any generalizations concerning placement practices in English must start with the nature of the subject. The Commission on English of the College Entrance Examination Board (1965) agreed on three major components in a recommended syllabus for college preparatory English: language (grammar and usage), composition (including rhetoric), and literature. These components tend to characterize college freshman English as well, but the best information on what constitutes freshman English as currently taught comes from the National Survey of Undergraduate Programs in English (Wilcox 1972). Pertinent results of that study may be summarized briefly as follows.

Whereas there is "enormous variety" among courses and little agreement on objectives, virtually all courses emphasize student writing (84 percent require seven or more papers a term). The most usual pattern is a course stressing composition (typically including grammar) followed by a course stressing literature, though these are often combined. In recent years there have been frequent curriculum changes and some diminution in required courses, though most colleges (93 percent) still demand at least one course in freshman English and three quarters require two courses. About one four-year college in four offers remedial work; a similar proportion devote the entire freshman year to composition and rhetoric. Evidently two-year colleges follow those patterns much more frequently (see Becker 1973; Shugrue 1970).

Since freshman English is taught in a variety of ways, individual courses may follow any of the sequences described in Figure 13 – ordered, homogeneous, or segmented. For example, a course in composition followed by a literature course is best described as an ordered sequence. Possibly the first should precede the second, but there is no really strong connection between the content of the two courses. Whether a student takes the first or second is not actually a placement decision but rather a matter of whether the composition course is exempted (i.e., Model 10).

On the other hand, the question of whether a student should take remedial English or the regular first course in composition is more probably a placement decision because these two courses form a more closely connected sequence than the previous case. Similar topics concerning usage and grammar likely run through both courses. For this reason the content of such sequences is often best characterized as homogeneous, more similar to foreign language than mathematics. In such typical English placement situations a traditional test of usage and grammar is probably an adequate basis for placement.

Dressel (1968) argues that there is continuity and sequence in the humanities as well as science and mathematics, but that the cumulative nature of the former is only less evident. Some writers (e.g., Johnson 1972) suggest that there are specific skills and knowledge that have to be learned in order to avoid continuing difficulty. This point of view implies a segmented sequence that consists at least partially of discrete competencies. But there has apparently been limited effort to introduce the sort of structure in freshman English that creates the segmented sequence implied by the model of individualized instruction described earlier.

Individualized instruction is well-known in English, but it usually operates in a very different way through individual attention to the competencies and the errors that students demonstrate in their work. There are English departments that organize their freshman curriculum into discrete topics to be mastered successively by students, but there is little evidence to suggest that this is a frequent tactic (see Casterline 1973, and Alford 1973 as near examples).

Some objectives of freshman English instruction are much more susceptible to organization into discrete topics than are others. It seems likely, for example, that the basic skills are subject to straightforward training in a more efficient, sequential manner than typically practiced in such courses. A good example is an individualized English course developed at Syracuse University (Brune, Taylor, and LaFay 1973). Its lowest level includes some 27 self-instructional modules covering sentences, punctuation, agreement, and usage. Students are placed into one or more of these four areas on the basis of placement tests and are advanced after demonstrating mastery on similar tests. Such examples of placement within a segmented sequence are not common in English, but the practice appears to be growing.

In general, some sort of placement in freshman English is widely practiced but poorly described in formal literature. Practically all two-year colleges (Bossone 1966; Becker 1973; Clark 1973) and many senior institutions place some students in remedial work. A very common practice is to place freshmen in remedial, regular, and a more advanced course. When these form a closely connected sequence of courses, it is appropriate to think of the advanced placement as vertical sectioning. Often, however, the advanced course is not actually part of a true sequence but represents an enriched alternative to the regular course. Such sorting is best described as horizontal sectioning (Model 9).

Another quite frequent practice is to group students into high, middle, and low sections of the same course on the basis of verbal ability, reading comprehension, or competency in English usage. When the instructional objectives of the sections remain the same, there is little hard evidence that such homogeneous sectioning is educationally advantageous (see review of ability grouping in Chapter 3), though the faculty may prefer this grouping procedure because it makes the instructional job more manageable.

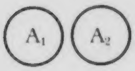
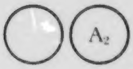
The English placement tests most often used by colleges typically provide one score of verbal ability or competency in usage. Many colleges find it useful to have students write an essay in the first week of class and adjust placements as the results may suggest. English placement – especially at the remedial end – has a reputation for marginal effectiveness. There seem to be two problems that go hand-in-hand. One is the need for better placement (diagnostic) tests that identify student strengths and weaknesses. Another is the need for an improved sense of the structure of freshman English so that instructional alternatives can be better matched with student deficiencies.

In the meanwhile a reliable test of English usage is likely to prove as good a means as any for identifying students who need additional work on the fundamentals of grammar and composition. When it comes to exempting students from rigorous instruction in writing, one can make a case that every freshman can be taught to write better than he does. Many English faculty would argue that demonstrated ability on an actual writing test should be the preferred means of waiving that requirement.

MODEL 3: VERTICAL SECTIONING

As noted earlier, vertical sectioning involves the notion of placing a student at an appropriate point within a course sequence. The decision on whether or not a student is ready to start the sequence is the more specialized case of remediation (Model 4), and the decision on whether a student has already achieved at a high enough level to complete the sequence is a matter of course exemption (Model 10) rather than placement. For example, in the segmented sequence of Figure 13, vertical sectioning is concerned with the decisions involving precalculus versus Calculus I or Calculus I versus Calculus II.

MODEL 3: Vertical Sectioning

ALTERNATE TREATMENTS	PURPOSE OF TREATMENT VARIATIONS
 Regular sequence	To start the student at an appropriate point in a sequence of courses
 First course exempted	

This vertical-sectioning decision is actually two decisions. One is a determination of the most appropriate point of entry within a sequence for a particular student. Another is the decision to waive prerequisite courses in the sequence. Usually, both of these decisions are also implicitly involved in exemption (Models 10 and 11). In exemption the primary emphasis is on waiving requirements, while in placement the emphasis is on point of entry. So a question naturally arises: What is the difference between a placement test and an exemption test, or can the same test be used for placement and exemption? It is a useful question because it helps to clarify the relationship between test characteristics and educational strategy.

PLACEMENT VERSUS EXEMPTION

All educators and test specialists would agree that an exemption test is an instrument tuned to the objectives and content of a course. On the other hand, various types of assessment have been used in placement: aptitude tests (see Clark 1973, Schenz 1964), composite measures of several abilities (American College Testing Program 1973), and personal qualities (especially in secondary education – see Chapter 3). But this report argues that content of both placement and exemption tests should correspond to course content. Rather than regard these as different types of tests, it seems more useful to distinguish ways that placement and exemption tests are used and to examine what implications those uses have regarding functional characteristics of the tests.

The decision regarding whether a student should be required to take a particular course depends on two considerations: the extent to which it is reversible and the extent to which it is self-correcting. Whether a decision to waive a course is reversible may depend on various local administrative considerations, but an important factor is whether credit has been awarded. Some institutions feel that the most equitable and flexible procedure is to award credit fairly freely when students are placed in advanced courses, but make credit contingent on satisfactory performance in the advanced course.

Whether a placement decision can be self-correcting is much dependent on the type of course sequence involved. In a homogeneous sequence it becomes readily apparent when a student is badly placed because the same general types of skills and content are represented at successive course levels. Furthermore, it is easy for a student to drop back a course and adapt to a less advanced level of instruction on similar content. A segmented sequence affords less self-correction because there is a clearer division of content between course levels. And in an ordered sequence there is little if any possibility of self-correction of "placement mistakes."

If a decision regarding which course in a sequence a student should take is self-correcting and reversible, a placement test is used primarily to establish point of entry. When such a decision is not self-correcting and not readily reversible, an exemption test is used primarily to waive requirements. There is a gray area between the two, but Table 4 summarizes briefly the main distinctions between the character and use of tests for placement or exemption purposes. Compared with an exemption test, a placement test is generally used in a more flexible manner and more closely tuned to the local instructional situation. A good placement test is much the more difficult of the two to construct if it includes subscores (as few do), because of the difficulty in developing valid, accurate subscores with limited testing time.

TABLE 4: Distinctions between the character and use of placement and exemption tests

	PLACEMENT TEST	EXEMPTION TEST
Purpose emphasized	To establish point of entry in a course sequence	To waive a course requirement
Nature of decision	Tentative, student may participate	Usually final, faculty determines
Credit awarded	Usually not	Generally yes
Cutting score	Liberal (more students are advanced)	Conservative (fewer students are advanced)
Norms required	Local	Local, systemwide, or class of institution
Content of test	Closely tuned to course, usually diagnostic	More general measure of comparable competency
Structure of test	Shorter, more numerous subscales, especially in a segmented sequence	Longer, more reliable test; usually little need for subscales
Need for security	Less	More

SECTIONING STUDENTS AND EVALUATING OUTCOMES

Having established that vertical sectioning is primarily a matter of determining an appropriate point of entry in a course sequence, it is possible to turn to the practical question of how students are sectioned at one level or another and how those decisions are evaluated. There seems to be a natural tendency on most campuses to assume that most incoming students should go into the first regular course in a sequence. Despite the fact of wide variation in student preparation in most subjects, advanced placement has been resisted traditionally in many quarters, and remedial work is often thought inappropriate. But the logic of placement argues that the curriculum structure and placement practices reflect what students know and what instruction they need in order to achieve educational objectives without undue strain or lost motion.

Implementing vertical sectioning is a matter of setting cutting scores on the placement measure. There are several approaches to this problem. One is the partial randomization method (see Chapter 2) that identifies the score level below which students profit more from entering the lower course in the sequence and above which they profit more from entering the higher course. Of course that point—where trait and treatment interact—is not likely to be the best cutting score because it is also necessary to consider the greater time and expense for students who start at a lower level.

A second method is the normative approach. For example, if a placement test is administered to students just finishing a college course covering corresponding material, then cutting scores can be set on the basis of performance levels in the course. A study by Aleamoni (1973) illustrates this method. He recommended placement in the next higher course for all students who could achieve a score higher than that obtained by practically all students who made a D or F. On the illustrated scatterplot of Figure 6 this would mean a score of about 54.

A third method is to count hits and misses that result from placement (Kelley 1973). The basic idea is that students placed in a lower section should not make an A, and students placed in a higher section should not make an F. These constitute misses that should be minimized. A certain number of such misses are inevitable, but an overabundance of one or the other type would indicate that a cutting score is either too high or too low. The rationale of this method is to rely on teacher judgment to rectify the position of the cutting line.

A fourth method is closely related to the third but places the emphasis on student judgment. Students usually have a feel for whether a course is too easy or too difficult. They are more likely to express dissatisfaction with a demanding course than one that does not require too much; if that is taken systematically into account, there is much to recommend the use of student feedback to rectify the inevitable placement errors. Beanblossom (1970b) provides a useful illustration and discussion of the adjustment of cutting scores on the basis of systematic analysis of student reactions. An alternate use of student judgment is to provide a routine means for reversing placement decisions in the early part of a course. This procedure has the merit of automatically correcting most of the serious placement errors and also providing continuous information pertinent to the appropriateness of the cutting score in use.

Dunn (1966) describes a fifth method that combines the third and fourth. He developed a detailed set of rules to determine whether students were placed correctly or incorrectly within a sequence of five mathematics courses. The rules were based on three types of information: whether students thought they had been placed correctly, too high, or too low; what grade the student earned; and how hard the student said he had to work in the course. Rational combination of this information produces some cases of correct placement and some ambiguous cases, but it also produces groups of students for whom the information consistently implies over- or underplacement. These latter groups provide a useful criterion for judging the adequacy of the cutting score, and in fact the placement procedure in general.

This latter point illustrates that evaluation of a placement program in a particular subject is inextricably tied to the process of validating the placement test and examining the adequacy of the cutting score. The sorts of information generated by these processes are the sorts of information that lead one to judge that a placement procedure is educationally effective. Operational programs will naturally vary a good deal in the extent to which it is reasonable to undertake elaborate or continuous evaluations.

In initiating a placement procedure it is desirable to examine the validity of the placement measure and cutting score in as much detail as the situation warrants, and these procedures need to be monitored periodically as changes occur in the curriculum or in student preparation. In an overall evaluation there ought to be: (1) some empirical evidence that there is educational benefit in placing students differentially rather than grouping them together (in practice such demonstrations of trait-treatment interactions are quite rare); (2) consensus that the placement test is valid for the decisions involved; (3) evidence that cutting scores are equitable from the standpoint of student performance, student judgment, or both; (4) evidence that the overall level of unsatisfactory placements (both high and low) are within reasonable bounds; (5) evidence that the general effect of placement is positive with respect to curriculum articulation, faculty judgment, student attitudes, resource allocation, and any other pertinent factors.

As a final note on evaluation of vertical sectioning, it should be recognized that some applications do not permit evaluations of the sort suggested by TTI studies. Instead they must be judged on closely related logic. The Advanced Placement Program of the College Board is a good example. Often the AP Program is more concerned with exemption than placement (see Model 10), but when it does involve vertical sectioning, clean experimental comparisons are not readily possible. Since highly selected students participate in this program at the secondary level, placement scores are only available for students in a limited range of competency. This makes it impossible to undertake a normal TTI validity study, but satisfactory evaluative information can be gathered nonetheless.

In evaluating the use of AP scores for vertical sectioning, the critical implication of the TTI illustrated in Figure 12 is the assumption that those students who demonstrate advanced competency (satisfactory AP scores) and are placed in a higher level course, should achieve as well as or better than students of comparable ability who reach that higher course through a longer sequence including regular college courses. Thus in Figure 12 the AP assumption is that point B should be as high as or higher than point D. A number of studies have verified that assumption (e.g., Bergeson 1967; Burnham and Hewitt 1971; Fry 1973; see Losak and Lin 1973 for a similar study involving CLEP). Comparable data corresponding to point A in that figure are not ordinarily available, but most faculty are willing to assume that allowing poorly prepared students to skip part of a course sequence would surely lead to poor performance (i.e., that point A would lie substantially below point C).

MODEL 4: REMEDIATION

In discussing remediation it is first necessary to make clear what is being talked about, because as the term is used here remediation is closely related to compensatory programming (Model 8) and also to vertical sectioning (Model 3). Remediation here refers only to the process of bringing students up to an acceptable level of competency in a particular subject. A compensatory program, on the other hand, refers to a much broader effort to help poorly prepared students cope with college. A compensatory program might include remediation in several subjects, special counseling, assistance in study skills, etc. (see Chapter 5).

Remediation is a special case of vertical sectioning; its distinguishing characteristics arise from the fact that remediation does not involve college-level work as the college in question may define it. Figure 13 shows that vertical sectioning of students into one of the regular college mathematics courses always involves the question of whether some college-level work will be waived. But the decision on whether a student should take remedial work does

MODEL 4: Remediation

ALTERNATE TREATMENTS	PURPOSE OF TREATMENT VARIATIONS
Ⓐ Regular course	To teach the student specific content or skills required in higher courses
Ⓡ Ⓐ Regular course preceded by remediation	

not involve waiving requirements. It rather involves identifying students likely to have trouble in the regular first course because of specific deficiencies.

In the segmented course sequence in Figure 13, those deficiencies are represented by "a," competencies required for satisfactory performance in the precalculus course but assumed to have been acquired before college. When placement is concerned with repairing such deficiencies rather than waiving college-level work, there result two characteristic differences between remediation and vertical sectioning. One is the fact that a remedial placement test and the remedial instruction stress critical competencies rather than general coverage of prior coursework. Another distinction lies in the way cutting scores are set—that is, how students are identified. Remediation uses a prediction model to identify students who are likely to do poorly in the following (regular) course. Vertical sectioning uses a concurrent model to identify students who demonstrate achievement comparable to that of students who have succeeded in the prior course. In either case the validity of the model is demonstrated by the TTI (see Figure 12).

Cronbach (1967) suggests that remediation is essentially "hole patching," is not especially interesting psychologically, and may be of limited value educationally. He makes the good point that remediation is subject-matter mastery in a narrow sense. It doesn't seem necessary to apologize for that limitation so long as it is recognized. Broader educational goals must certainly be based on some reasonably solid foundation of minimum competency, and as Gagné (1970) and Carroll (1967) argue, some of that hole patching may involve fundamental misconceptions that seriously block further learning and transfer of knowledge to new situations.

In any event, remediation is a general problem in higher education. This is partly due to the expansion of mass higher education and greater representation of poorly prepared students. By some counts, 70 to 75 percent of all incoming freshmen taking mathematics and English in California community colleges are in remedial courses (Roueche 1968). Furthermore, remediation is practiced at radically different levels of student competency. For example, in recent years freshmen entering the University of California who make a score of less than 550 on the College Board English Composition Test have been required to take noncredit English. If similar standards were applied throughout the country, some 80 percent of all college freshmen would start with "remedial" English. Another complication is the fact that what many colleges call remedial work may not involve any effort to identify and deal with specific deficiencies; it may simply represent a lower level course that does not carry credit.

These considerations point up the futility of arguing whether higher education should or should not offer remedial coursework. The important questions are whether individual freshmen have the minimum competencies to succeed in the beginning courses at the colleges they enter and whether the college is successful in helping deficient students acquire those competencies. Considering the breadth and importance of the problem, one would expect that it had been examined with some care, but this is not the case.

RESEARCH EVIDENCE

Hills (1971) recently commented dryly, "It does not seem to be widely realized that remedial courses are generally not very effective in improving subsequent grades or reducing withdrawal when soundly evaluated." This judgment may overstate the matter, but it does get to the nub of two difficult issues that cannot be avoided. One is the questionable effectiveness of much current remediation; another is the rarity of systematic evaluation of such efforts.

There are scattered "alarming statistics." For example, Bossone (1966) reports that 40-60 percent of the students taking remedial English in California community colleges received a D or an F, and that only 20 percent later enrolled in regular college English courses. There are also subjective "exposés" of remedial coursework (see Mayer 1973 and subsequent letters to the editor in the same source) that reveal, more than anything else, the level of emotional involvement that surrounds the whole matter of egalitarian, student-centered higher education.

Those writers who have made an effort to search out and summarize evaluative research of remediation (Roueche 1967; 1968; Roueche and Hurlburt 1968; Hills 1971; Losak 1972) complain of the small number of published studies and the limited evidence that remediation works. Nor does there seem to be much unpublished local work of value. Losak (1972) searched through 822 dissertations on community colleges and found eight with titles that suggested evaluation of a remedial program. None of the eight incorporated an adequate control group.

Published evaluations of remedial courses present an ambiguous picture. Some indicate improved performance on the particular type of material covered in the remedial course but no evidence of subsequent beneficial effect (Ahmann and Glock 1959, Daly and Stahmann 1968). Losak (1972b) carried out a study that was well controlled compared to most in this area. From a group of community college students routinely assigned to a remedial reading/writing course, he selected randomly a group to move directly into the regular English course. On the basis of followup comparisons, Losak concluded, "As presently designed, the program does not produce any meaningful reduction in student withdrawals from college; is not effective in raising students' grade point averages during the second semester of college; does not result in achievement at a higher level in social science, humanities, or English courses; and is not effective in producing significantly higher scores on a writing test or reading test."[6]

Some other systematic evaluations have yielded less pessimistic results. Sharon (1970) carried out an experimental evaluation of English and mathematics remediation in two community colleges. In both subjects, his data indicated that students who took the remedial course made approximately one-half letter grade higher in the regular freshman course than did a randomly selected control group who went directly into the regular course. Paradoxically, however, low ability students were just as likely to pass the regular course as the remedial course on the first try. In another study of five community colleges, Haven (1971) found some evidence that remedial English was beneficial. Even though students assigned to remedial English courses made substantially lower placement scores than students in the regular course (25th versus 50th percentile), achievement in the regular course was comparable for the two groups.

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[6] In a personal communication, Losak reported that subsequent studies "continue to show no differences on the criterion measures between experimental and control groups."

Each of these studies contains shortcomings of one sort or another – because of the nature of the placement test, the character of the remedial course, methodological flaws in the evaluation procedure, or all three. They certainly do no more than scratch the surface of understanding. Undoubtedly there are useful individual courses, but if the literature on remediation warrants any conclusion, it is that the bulk of remedial instruction proceeds with little clear indication of its value. Also, it is now widely assumed that effective remediation requires a more systematic approach than conventional repetition of high school material.

COMPETENCY-BASED REMEDIATION MODEL

The instructional theory and placement tactics discussed earlier in this chapter provide the general outline of a systematic approach to remediation that focuses on the competencies students need to succeed in a particular subject. This approach includes the following steps.

1. *Identification of discrete types of subject knowledge and skills that are critical for success in initial college-level work in the particular subject.* These correspond to portion "a" of the segmented sequence of Figure 13. Ideally they are specific competencies that can be organized as separate unit topics for purposes of instructional management and evaluation.

2. *Selection or development of placement test and instructional materials for each topical unit that match the discrete types of knowledges and skills required.* Placement test and instructional materials should be synergistically related: the test is designed to identify competencies that are subject to improvement through remedial instruction; the instruction is designed to bring about demonstrable improvement on the placement test. Score gains on the placement test following instruction help to validate both test and instruction.

3. *Placement of students into remedial sections according to individual deficiencies.* This step may involve a single stage in which students are prescribed different topical units on the basis of a multiscore placement test. Or it may involve two stages whereby students are first placed in a remedial group on the basis of a test of

relevant skills and then prescribed individualized instruction on the basis of a second stage of finely tuned diagnostic testing. In either event the justification for placing students in remedial work is high probability of unsatisfactory performance in the regular course.

4. *Continued instruction/learning to an acceptable level of mastery of successive topical units.* The emphasis is on acquiring the necessary knowledge and skills to move ahead, not on competitive performance or finishing the work in a set amount of time. Thus some students with few deficiencies may move into regular coursework quickly, while other students may repeat topical units as necessary (without punative grading) but be held to the same acceptable standard.

5. *Evaluation of the remedial program to demonstrate its educational usefulness.* Such usefulness may be rationalized in part by clear student gains in the critical competencies involved, but in the longer view, remediation should be demonstrably superior to simply putting all students into the regular course and recognizing that some proportion will have to repeat it. Superiority of a remedial program for selected students is best demonstrated by showing that a trait-treatment interaction (see Figure 12) makes it possible to identify students who learn more effectively from different placements. At the least it should be possible to show that a remedial course helps poorly prepared students to cope with regular coursework more successfully than comparable students who have not had such assistance.

Published literature reveals only a few remedial programs in mathematics and English that follow this general line—and most are evidently quite recent in development (e.g., Ablon 1972; Buzard 1973; Knutson 1973; Peck and Brinkley 1970). The mathematics program at Staten Island Community College (Ablon 1972) is an especially good illustration of steps one through four.

The primary purpose of the Staten Island program is to prepare students to enter the regular precalculus course as quickly as possible. The department does not recognize any particular high school or college course as a necessary or sufficient indicator of the needed preparation, nor does it wish any student to take any unnecessary work. Consequently an introductory series of mathematics modules was developed: (1) operations on numbers, (2) operations on polynomials, (3) linear equations and lines, (4) factoring and operations on algebraic equations, (5) exponents and trigonometry (optional introduction to precalculus topics).

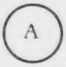
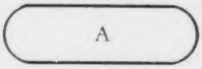
The sole criterion for including a topic was whether the topic was necessary to a later topic in precalculus. Each of the modules is one-fourth semester in length, and all are offered concurrently. A placement test covering the content of each module is used to start each student at an appropriate level. At the end of each quarter of the semester the student is evaluated on the module just completed; he moves on or repeats depending on whether he reaches an acceptable level of competency. The only grades are pass and incomplete. Thus the primary emphasis in testing, instruction, and grading is to insure that the student has mastered what he needs to know.

This latter point suggests an important distinction between traditional and a competency-based model of remediation. The need for remediation is signaled when a large proportion of freshmen fail an introductory course that is a continuation of study at the secondary level (principally mathematics and English). The traditional tactic has been to predict which students are likely to fail and provide those students with a review of the subject. This tactic assumes that the main concern is to use a placement test or composite measure that correlates well with grades for students who go directly into the regular course (American College Testing Program 1973; Ford 1970). This assumption is correct but insufficient. If a measure is to be useful for placement, it is equally important that it have a low correlation with grades in the regular course for those students who go first through a remedial course (see Figure 13 and discussion in Chapter 2). The developing rationale throughout this chapter suggests that the placement test most likely to have both characteristics is one that is carefully tuned to the competencies required in the regular course and the content of the remedial course.

MODEL 5: GROUP PACING

In remediation and vertical sectioning, the length of a course sequence is varied by placing students at different entry points. Another general approach to varying the length of a sequence is to structure the instructional situation so that students move at different paces. Differential pacing implies that students learn at different rates and that, in general, learning rate is a useful idea for developing instructional treatments, monitoring student progress, and evaluating outcomes. As a scientific construct, rate of learning is exceptionally complicated for a variety of technical and theoretical reasons. Cronbach and Snow (1969) provide an excellent discussion of these complications.

MODEL 5: Group Pacing

ALTERNATE TREATMENT		PURPOSE OF TREATMENT VARIATION
	Regular course	To match the rate of instruction with the student's rate of acquisition
	Course length determined by rate of achievement	

But from a practical pedagogical standpoint, there is the obvious fact of wide individual differences in the amount of material different students are able to master in a given amount of time. As has already been discussed, individualized instruction places a great deal of emphasis on self-pacing—partly to allow for individual differences and partly to give students more personal control over their own learning experience. There are many forms of pacing. Some vary at the individual level; others represent group adaptations—i.e., alternate treatments.

FORMS OF PACING

The most individualized form of pacing occurs in programmed instruction and computer-assisted instruction. In these instances adaptations to the individual pace occur at the micro level of specific knowledge and skills. At a somewhat more molar level, pacing is provided through individual mastery of successive topical units. In either event pacing means that the student spends whatever amount of time is necessary for him to learn the particular portion of material to a minimum level of competency. But the full significance of pacing comes into play only when considering how much material students cover in a given academic period for a given amount of academic credit For if all students cover the same instructional units in a course, self-pacing mechanisms serve mostly to individualize the way students allocate their time.

Pacing alters the length of the sequence when a greater or lesser amount of material is covered per unit time. Glaser's (1968) description of Individually Prescribed Instruction illustrates how elementary school students cover quite different numbers of units in mathematics for the same "credit" (promotion to the next grade). On the other hand, Gougher (1971) describes self-pacing procedures that yield differing amounts of credit depending on how many units are completed in a given term. This practice has become fairly common in foreign-language instruction following an influential series of papers by Carroll (1962; 1963; 1965; 1970) that developed the notion of aptitude as time required to master material. As already noted, another increasingly common form of individualized pacing allows the student to receive credit for the course whenever all units are completed (Mitchell 1973; Keller 1968; Bosworth and Benamou 1968).

These forms of pacing provide individual flexibility, but they suffer other disadvantages. Any system that offers such individual pacing must be based on a suitable course structure and appropriate administrative procedures, and these may be difficult to bring about. For example, in the usual administrative arrangement at most colleges there might be little advantage for a student to finish a course in mid-term. Another problem is that some objectives may not be attained easily without the direct instructional guidance and interaction available in a traditional class situation. These distinctions between individual and group pacing are not always cleancut, but the latter is much the easier to implement, and it is the latter with which this report is primarily concerned.

Group pacing is probably common, though such adaptations are infrequently described in professional literature. Mayer (1973) and [illegible]ola (1973) cite examples of an evidently increasing tendency to offer introductory courses in a regular and lengthened version. That is, a precalculus course may ordinarily be covered in one term, but students who anticipate difficulty would have the option of taking a two-term sequence covering the same material. This form of placement can be seen as an alternative to remediation. Group pacing can also work the other way (as an alternative to advanced placement). Willingham (1961) described a three-quarter chemistry sequence that was collapsed into a one-quarter alternative for students with a good background in high school chemistry who needed only a rapid review plus coverage of college-level material.

There are clearly many possible variations within this general model of group pacing. That is, there are various ways that the content of a sequence can be lengthened or shortened depending on the student's demonstrated ability to handle the material. No effort is made here to describe all the possibilities. There is also wide variation in practices regarding the awarding of credit for students placed in longer or shorter sequences than normal. If there is a trend, it seems in the direction of granting credit for work not previously creditable.

THE CRIMEL PROGRAM

An especially interesting program of group pacing has been developed by the mathematics department of Ohio State University. The program is worth special attention not only because it includes innovative features; it also represents a noteworthy and evidently quite successful effort to adapt a very large instructional program to individual differences.

The CRIMEL Program (Curriculum Revision and Instruction in Mathematics at the Elementary Level) has evolved over a period of several years (Riner and Waits 1973; Waits 1973; and Elbrink 1973). A first step was the development of five modules representing regular precalculus instruction: basic algebra, functions and graphing, transcendental functions, trigonometry and complex numbers, and elementary differential calculus. Each module normally requires two to three weeks to complete, but students can elect classes paced fast, medium, or slow so that different amounts of material are completed in one quarter. These different paces earn three, five, or eight quarter hours credit when successfully completed.

Instruction in this program is carried on in conventional classes supplemented by television lessons, computer-assisted instruction, self-instructional materials, tutoring, and videocassettes that can be used on demand. A special feature of the program is its "flexible and forgiving" testing option. Students take tests on the individual modules in special testing centers whenever they elect. Within limits, students can repeat tests in an effort to earn a higher grade. This option is used often and highly regarded by students and faculty. As would be expected the variety of options present formidable record-keeping problems, but these have been mitigated considerably by a computer-assisted maintenance system (Mader 1972).

The repeat-testing feature of the CRIMEL program also illustrates the need for alternate tests and the fact that each test contains only a sample of the much larger universe of items that could be written on a particular topic. This is a convenient place to emphasize that a good placement/instructional model should emphasize teaching students the *types of items* that are found on the end-of-module test. It is equally important that one does not teach to the specific items and that test items must be representative of the various ways in which students should be able to deal successfully with the skill or knowledge involved.

In large part, the CRIMEL program has been evaluated on an operational basis—that is, student and faculty reactions, failure and retention rates, and so on. But Mader (1971) did undertake a special evaluation that focused on the strategies for placing students in fast, medium, or slow sections. In general, students recommended for slower sections achieved higher than comparable students in faster sections. More interesting, however, was the finding that a placement strategy that utilized student choice of pacing level yielded a higher proportion of correct decisions. The author also concluded that it was far more dependable to use achievement information obtained after students had started the course than to rely solely on precourse information. These results have useful implications regarding the methods used for grouping.

GROUPING METHODS

In considering how to group students for differentially paced instruction, the first question concerns the most appropriate type of measure to use. The history of empirical learning research and more recent theoretical work (Cronbach and Snow 1969; Carroll 1963) clearly agree that there is no such thing as a general aptitude for learning. The rate at which a given individual is able to learn new material varies with the subject matter and the conditions of learning. On the average a bright student can be expected to learn academic material more rapidly than a mediocre student, but in practically all instances the best indication of how fast a student can learn specific material should be how much he already knows about that specific material. A good illustration is Glaser's (1968) finding that initial knowledge of mathematics correlated .61 with number of mathematics units completed over a three year period, while general intelligence correlated only .32 with units completed. As in the case of previous placement models, the implication is that the content of the placement test should match as well as possible the course content at the point of placement.[7]

On the other hand, pacing is not merely a matter of how fast the individual is able to go; an equally important question is how fast he is willing to go. There are many extenuating circumstances (e.g., motivation, specific educational objectives, competing time demands) that may have an important bearing on the choice of the best pace for a particular student and a particular course. Group pacing probably works best when students (1) exercise their own option regarding pacing, (2) have access to expectancy information connected to placement test scores, and (3) are able to change pacing levels after some initial experience in the course.

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[7] For these reasons the possibility of including an assignment model (i.e., in Chapter 3) – for sorting students into fast and slow sections on the basis of learning aptitude – was considered at length but finally rejected. Pacing decisions do arise when there is little basis for knowing how fast the student can go beyond evidence of some general or special scholastic aptitude – e.g., when students are starting a foreign language. The matter is admittedly complex, but available evidence suggests that pacing decisions are better based on evidence of how well the student handles the specific subject and that any grouping into different paces on the basis of aptitude tests should be provisional until the student gets into the course and better indicators of optimal pace thereby become available.

5

Selection for Special Treatment

This chapter takes up alternate treatment models that are best characterized as selection strategies. In the overall framework used here (see Table 1), selection means grouping students on the basis of aptitude or other personal characteristics in order to put them in alternate treatments not based on the same subject matter or objectives. A common example is which students should go into an honors as opposed to a regular program? The honors program is more difficult because it covers much more, either in breadth or depth. The strategy is to select students with high ability for such a program because the very able student is more likely to profit and succeed.

This is the same meritocratic strategy that underlies selective admission to American colleges – colleges that are widely stratified according to student ability (see Darley 1962 for a classical analysis, and Dillenbeck and Wetzel 1972 for extensive data). The philosophical basis of this hierarchical arrangement stems from a fact and an assumption. The fact is that there is exceptional diversity among college students with respect to scholastic ability. The generally accepted assumption is that it is desirable to specialize education and training at levels appropriate to individual capabilities and to the demands of different lines of work. A hierarchical system provides multiple levels of access for students of different ability and facilitates efficient and effective education through some degree of specialization in rough accord with ability level. Glazer (1970) draws a clear and persuasive connection between the need for a hierarchical system and the need for an open, yet striving and competitive society that can renew itself and meet outside challenges.

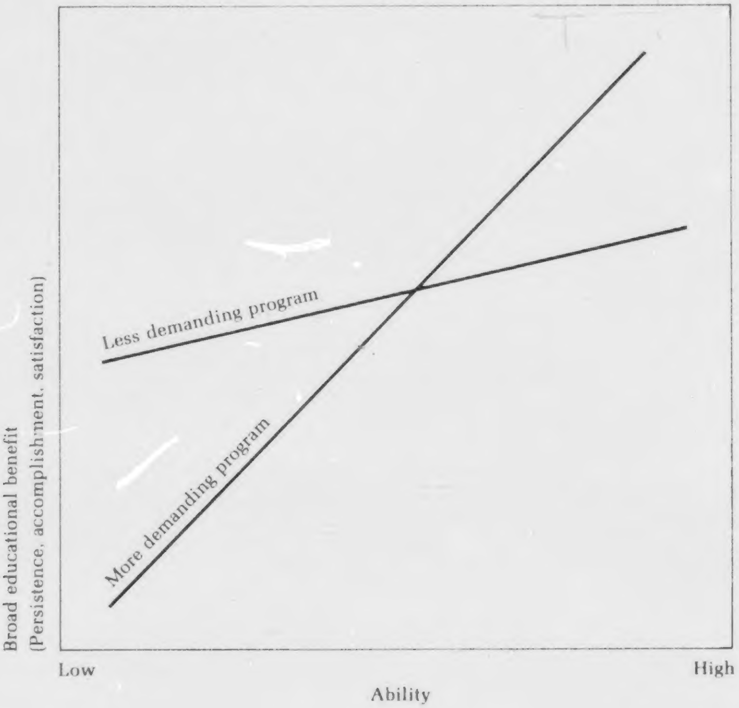
The foregoing is sometimes criticized as a conservative view. Radical rhetoric notwithstanding, the facts of hundreds of validity studies at individual colleges indicate that a below average high school graduate is unlikely to compete successfully in the educational program of a highly selective college. Given the stratification of colleges, selecting students who can succeed seems intuitively defensible from the standpoint of the individual student or from broader societal considerations. But what has this to do with "selecting" students who are already in college? For several reasons the same problem of diversity exists within institutions as among institutions.

First, it has long been recognized, even in the highly selective colleges of British universities, that there is always some proportion of students in each institution who are so able as to make the regular curriculum quite inadequate. Second, the broadening of opportunity for postsecondary education has brought substantial numbers of students to college, particularly community colleges, who are not adequately prepared for the curriculum. Third, many state colleges and public universities have always attracted a very diverse student body. The trend toward open admission has greatly exacerbated the problem of providing effective education to students of very different ability in the same institutional context.

There is a superficial parallel to the problem of ability grouping in the lower grade levels where teachers must cope with a broad range of ability. Chapter 3 reviews the sorry history of research on ability grouping, all of which is starkly inconclusive with respect to the benefit of such practices. Recall, however, that a principal reason for the lack of any clearly demonstrated advantage to ability grouping at that level is evidently the fact that grouping experiments in elementary and secondary school seldom make any clear distinctions as to how substance and objectives should differ for different groups. In contrast, the selection models discussed in this chapter do very specifically assume different content for specially selected groups.

One of the principal and time-honored ways of handling this problem of diverse aptitude (aside from giving failing grades) is to encourage the better students to go into tough programs and departments and steer the poorer students into other areas with lower standards. This is a partial solution, and a perfectly legitimate one, but as indicated in Chapter 1, it is part of a totally different strategy of adapting higher education to individual differences. Allowing very different standards in different parts of an institution (often while pretending not to notice) is a means of adapting to individual differences—a means that is essentially equivalent to providing a

FIGURE 14: Hypothetical relationship between the student's ability and the benefit of a more versus a less demanding program



choice of institutions and a choice of careers. This report does not deal with those types of mechanisms, but three general selection models that do fit the framework of the report can be distinguished.

1. The simplest type of selection within an institution is referred to here as *Model 6: Selective Sectioning*. This refers simply to a course or academic activity that is quite demanding and requires some screening to insure that those students admitted can handle the task.

2. At a much broader level there are comprehensive programs designed for specially able students. The specific character of this strategy varies a great deal, but it can be referred to generally as *Model 7: Honors Programming*.

3. Corresponding to Model 7, but at the opposite extreme of scholastic capability, is *Model 8: Compensatory Programming*. This model refers to concerted and integrated efforts to compensate for inadequate preparation of entering students.

All three of these models involve the same basic selection strategy. As was true in the case of the assignment and placement models discussed in previous chapters, the main characteristics of the selection strategy can be illustrated in the framework of decision theory as shown in Figure 14. This by now familiar representation formalizes the assumption that there is more benefit for able students in tough programs and more benefit for less able students in less demanding programs. Consequently, if there is a wide spread of academic ability in an institution, special provision for students of especially high and/or low ability should increase the overall benefit.

In evaluating such benefit, it is important to recognize that one cannot make any direct comparison of specific achievement of students in more demanding versus less demanding programs, because the content of the program is not the same – i.e., one cannot directly compare the utility of different programs. What can be done, and what needs to be done, it a more general evaluation of broad educational benefit that accrues from selective programming. The benefits you are looking for include heightened persistence toward educational goals, comprehensive understanding of a chosen field, unusual accomplishments, and student awareness and satisfaction with the progress made.

Choosing students for selective programs involves use of well-known prediction methods much as they are applied to college admission. The objective is to select students for difficult programs who stand a good chance of succeeding and profiting. In the case of the less difficult program, it is a matter of selecting students who are likely to fail the regular program unless special action is taken. There are useful standard references to prediction techniques (Michael 1969; College Entrance Examination Board 1969; Hills 1971). The following sections deal with the practical problems of selecting students and evaluating the educational benefit of special courses, honors programs, and compensatory programs.

MODEL 6: SELECTIVE SECTIONING

Selective sectioning involves selecting able students for a special course. It is the simplest case of grouping high aptitude students within an institution. The model arises when two contingencies come together: (1) a department or college offers an especially difficult course that many students could not be expected to handle, and (2) there are no appropriate prerequisite courses in which students would normally be able to demonstrate the necessary competency to succeed in the special course. In such situations the special course is often called an honors course, and the problem is to select students with enough ability to profit from it. But "honors" is a word used in various ways. This model should first be distinguished from other somewhat similar ones, and what is *not* being

MODEL 6: Selective Sectioning

ALTERNATE TREATMENTS		PURPOSE OF TREATMENT VARIATIONS
?	Whatever the student takes instead of Course X	To offer an advanced or enriched course to those students able to profit from it
X	A course available only to qualified students	

talked about under selective sectioning should be clarified.

Some honors courses cover essentially the same material as a regular course sequence except that the pace is faster. The notion of pacing is frequently tied to individualized instruction. In that case achievement in the particular subject provides the best measure for selecting students, and placement Model 5 is the most useful approach to the problem. If the student has taken no work in the subject (e.g., a first course in Russian), then the present model is perhaps the best initial approach to differential pacing.

Often, an honors course is designed as an alternate to a regular course. Ordinarily, selection of students for such a special course would fall clearly under selective sectioning, but if it is intended that students should take the special course because they already know the material in the regular course, the situation is different. The most familiar example is honors English as a substitute requirement for the usual freshman English; the general case is discussed later as *Model 9: Horizontal Sectioning.*

Finally, there are some instances in which a course is called "honors," but it involves only independent study as opposed to attending classes. No special selection is involved, and the same subject matter is covered, perhaps even to using the same final examination. This type of alternate treatment actually conforms more closely to *Model 1: Method Variation* than it does to selective sectioning.

The tactics of selective sectioning follow closely the procedures of a routine prediction study. The usual steps include choosing promising predictors, carrying out a correlational analysis of predictors and final course grade, identifying the best composite measure to use for selection purposes, and setting a reasonable cutting score. A pair of studies concerning an honors language course provides an example (Willingham 1962; 1963).

In 1961 Georgia Institute of Technology instituted an honors program in elementary German. The intention was to provide intensive instruction and enriched content rather than simply cover the same material in less time. Since it was a demanding program compared to regular freshman language instruction, the problem was to predict as accurately as possible which students would be most likely to succeed. The predictors that naturally come to mind first are those already available. In this case they were high school average, Scholastic Aptitude Test, and College Board Achievement Tests in English and mathematics.

The results of the first study indicated that high school average was a fairly good predictor of German grades (r = .44) and the available test scores did not make a significant contribution to prediction accuracy. One other hypothesis was tested: whether students who had studied some foreign language in high school were more likely to succeed in an honors course, other factors being equal. Holding ability constant, it did appear that students who had studied a language made slightly higher German grades, but the difference was not large enough to be helpful in selecting students. The first study closed with the suggestion that perhaps a language aptitude test might be helpful in identifying successful honors students.

A second study the following year examined that possibility through an experimental administration of an artificial language test. This test required the student to translate sentences to and from English using arbitrary grammatical rules and a special vocabulary resembling no well-known language. Results of the second study were generally similar to the first, but this time the Achievement Test in English did make a useful contribution to high school average in predicting success in the honors course (raising the correlation from .45 to .50). This was probably a reliable finding, since the second study was based on more than 400 students.

But the artificial language test—the main feature of the second study—did not work out as hoped. The test was significantly related to German grades, but it did not make a large enough contribution to already available measures to warrant the expense and bother of a special administration (it increased the multiple correlation from .50 to .53). The practical conclusion to the studies was to use high school average along with the Achievement Test in English for selecting honors German students and to assume that a correlation of .50 was about as good prediction as could be expected in the situation. It was possible to set a cutting score that would exclude most students who were having difficulty with the program.

This example illustrates that the mechanics of selecting students for a special course are fairly straightforward and quantifiable. Whether the overall program is worthwhile is another question—a more subjective and complicated question—that must be carefully evaluated in each individual situation. The following questions suggest some issues that need to be considered in making such an evaluation.

Is there evidence that the competency of the honors students in the subject is substantially more advanced or sophisticated (not necessarily with respect to factual knowledge) than that of similarly able students who have completed the most generally similar regular course?

Is there a substantial and continuing student demand for the course?

What is the faculty's judgment regarding the value of this particular course for relevant degree programs? Does the course offer intrinsic benefit to students or indirect benefit to the faculty or the institution that cannot be achieved by other means?

Is the total direct and indirect cost of offering the special course favorable in relation to the benefit it offers?

Such questions are not easy to answer, but they frame the issues.

MODEL 7: HONORS PROGRAMMING

The basic idea of the honors program is to provide an enriched educational experience for especially able students. Many activities have been called honors programs. Sometimes they are actually nothing more than clubs, a trip abroad, or a laudatory designation on the diploma. An honors program referred to here means a far more comprehensive, integrated educational activity. The previous model was concerned primarily with content of a particular course, but an honors program is continuous over several years, and ideally it upgrades the student's entire degree program. The honors program is an organized effort to give all superior students a different learning experience.

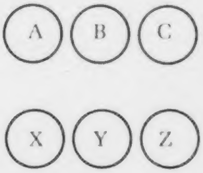
Frank Aydelotte is generally conceded to be the father of the honors program in this country. In the 1920s he introduced a successful program at Swarthmore that was well publicized and widely respected. But initially few institutions were much influenced by the Swarthmore work. It was only the events of the 1950s that focused attention on talented students and encouraged wide development of honors programs.

Some prominent studies of that period indicated that all was not well with the education of the gifted. Substantial numbers of bright students were not going to college. Those who did often found little challenge in a freshman year that largely repeated the last year of secondary school. Furthermore, many students were drifting through school with little solid work in tough courses – mathematics and languages especially. When Sputnik went up, all these problems came into focus. The public and educators alike insisted that talented students get a better education.

MODEL 7: Honors Programming

ALTERNATE TREATMENTS

PURPOSE OF TREATMENT VARIATIONS



Regular courses

Honors courses

To offer a challenging, integrated program to specially talented students

Honors programs spread rapidly in the late 1950s and early 1960s. During this period the Inter-University Committee on the Superior Student (ICSS) acted as a clearinghouse and a catalyst to support the movement. One useful function of ICSS was to codify and spread the word on what constituted an honors program. The committee enunciated a number of principles that can be paraphrased as follows (see Cohen 1966 for the full discussion).

1. Identify and select students of high ability as soon as possible; start programs for these students immediately on entrance to college.

2. Make honors continuous and cumulative through the four years and well integrated with the student's area of concentration.

3. Set aside requirements that restrict a good student's progress;

make the program varied and flexible by establishing special courses, honors seminars, independent study, advanced placement, etc.

4. Make the honors program visible in the institution so that it will provide a model of excellence—an emphasis on intellectual quality rather than grades.

5. Employ methods appropriate to superior students—e.g., small classes, use of primary sources, encouraging student participation, independent study and special research projects, special counseling, and attention to individual needs and interests.

6. Establish an honors center and special facilities for honors students where possible.

7. Select faculty who are best qualified to provide intellectual leadership.

8. Maintain liaison between the program and appropriate student groups and the graduate school.

9. Build in procedures for routine evaluation; set up administrative conditions to insure that the program is institutionalized as a permanent tradition and feature of the college.

In general, honors programs tend to share these characteristics, but an ICSS national survey documented wide variation in programs (Phillips 1967; 1973).[8] From an academic standpoint programs tend to stress either general enrichment or intensive work within a department—sometimes both—but it is mostly the liberal arts colleges that have honors programs. According to the most recent data (mid 1960s), honors programs were quite rare in applied fields like education, engineering, and business. An emphasis on general honors may involve a comprehensive core curriculum or a number of honors courses the students may elect. In the latter case there is frequent emphasis on interdisciplinary seminars. There is also heavy emphasis on independent study and research, particularly within departments.

Another important aspect of honors programs is the built-in reward system. Mayhew (1970) speculates that attractive amenities are important in honors programs in order to attract students to the more difficult work that does not necessarily carry corresponding weight on graduate school applications. It is not unusual for honors students to have a variety of special privileges: early registration, library carrels, special advising, exchange programs, honors dormitories, discount or free books and tickets, use of special facilities, invitations to faculty seminars, and opportunities to meet distinguished visitors.

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[8] A good source for descriptions of individual programs and current issues concerning honors programming is *Forum for Honors*, newsletter of the National Collegiate Honors Council.

Such prerequisites seem related to several problems now plaguing honors programs. In the early 1960s the especially talented student was the darling of higher education, but priorities often change to the detriment of valuable programs. The special privilege of honors programs now often gives rise to charges of elitism – a criticism that questions the very basis of the movement. Another problem is the typically low representation of minority students in honors programs. Finally, the financial squeeze has brought special pressure to bear.

These problems are obviously not unrelated, and they cast a pall on honors programs in the early 1970s. As a leading spokesman reported, ". . . rumors descend, phone calls, visitors – and they are beginning to add up to the impression that Honors budgets have been cut, sometimes drastically, that directorial jobs are threatened and that student applications have fallen off from last year" (Portz 1972b). These trends have had a definite effect on the way honors students are selected and the way programs are evaluated.

Traditionally honors students have been selected on the basis of general academic ability and interest in the program. The typical pattern in the 423 programs described by Phillips (1967) was to grant eligibility to upper-class honor students primarily on the basis of a minimum point average – often 3.0 or 3.5 on a 4.0 point scale. In the case of freshmen, a dual criterion of high school grades and admissions test scores is the usual pattern. Evans (1972) provides a good illustration of a conventional prediction approach at the University of Kentucky that "reduced the real mortality figures to insignificance." While the initial screening for an honors program has almost always been based on some readily available measure of scholastic ability, other personal factors usually come into play in filling the quota for a particular program. This is especially important in programs that emphasize independent study and research.

The problems previously mentioned have evidently had sharp effects on admissions policies. Some institutions practice open admissions to honors programs; others make heavy use of what Portz (1972) calls soft indicators: "We look, also, for evidences of extracurricular involvements, for some kind of devotion to a cause (public service, sports, writing), some pursuit that reveals what the student feels strongly about. We are looking for that will-o'-the-wisp, creativity. . . ." It is undoubtedly true that honors programs that make unusual demands on students may require unusual selection criteria, but open admissions—if taken seriously—would seem to constitute a policy nonsequentive of serious dimensions. It is hard to rationalize the development of an especially difficult program that is open to any student.

In any event, "evaluation of honors programs has been for the most part subjective and nonscientific." So says Paul Heist, who is especially known for research on educational programs for talented students. Heist (1968) cites several studies that indicate that students in honors programs tend to profit more from their education than do similar students in regular programs. He admits, however, that few colleges have made any serious effort to examine the overall effects on the student, the faculty, and the sociology of campus life (see Wright 1972 for a brief but useful general discussion of program evaluation).

A survey of independent study by Dressel and Thompson (1973; Thompson and Dressel 1970) provides some interesting implications because, as they say, independent study is inextricably interwoven with honors programs. The concluding tone of their analysis is pessimistic, almost dreary. Even though Dressel and Thompson give a number of perceptive suggestions for improving independent study, they note that most efforts have been so compromised by doubts, antagonisms, or sheer ineptitude that few undergraduates attempt independent study; even fewer do so successfully. "In an era of open admissions and tight budgets many administrators feel that independent study is a lost cause."

If honors programs generally are not to be a lost cause, they will have to handle the dual problems of cost and elitism. The need for colleges to maintain showcase academic programs will no doubt save many honors programs, but they must certainly continue adapting to new conditions. It is likely that honors work will lay increasing stress on experiential learning. Experiential learning is adaptable to a wide ability spectrum; it stresses current educational values; and with care it should be possible to develop valuable off-campus learning experiences that are cost-efficient as well as challenging to superior students. See Peterson (1973) for an example.

MODEL 8: COMPENSATORY PROGRAMMING

Remediation (Model 4) has been discussed as an instructional problem of upgrading a student's competency in a specific academic subject. Compensatory programming refers here to a much broader effort to deal with the educational problems of academically disadvantaged students. In a sense, compensatory programming is to remediation in a single subject as honors programming is to selective sectioning in a single subject. The two types of programming have much in common; they both select special students for a comprehensive alternate treatment. Educators have dreamed up an endless variety of euphemisms for special programs for weak students: remedial programs, compensatory education, developmental programs, guided studies, directed studies, general curriculum, and so on. There is wide variation among such programs, though the different names have no special significance.

MODEL 8: Compensatory Programming

ALTERNATE TREATMENTS		PURPOSE OF TREATMENT VARIATIONS
Ⓐ Ⓑ Ⓒ	Regular courses	To offer an integrated program for poorly prepared students
Ⓡ Ⓢ Ⓐ	Remediation, basic skills and some regular coursework	

There are a number of reasons why a comprehensive program should be superior to course-by-course remediation for some students. There are two principal considerations. Aside from the inadequacies of traditional remediation discussed in some detail in the previous chapter, especially weak students are typically weak in several areas – in critical subjects as well as basic academic skills. Consequently, it is often more effective to deal with this student's total problem rather than proceed on a piecemeal, departmentalized basis.

Another reason for the comprehensive program is the fact that lack of specific competencies is perhaps not the most serious problem that seriously deficient students face. Cross (1971) places special stress on the attitude blockages of students who are constantly threatened by failure. In a survey of community colleges, she found that the most frequently cited obstacle to learning for weak students was: "Lack of effort; has quit trying." When students are convinced they cannot learn, it is obviously important to provide adequate personal support, to structure the individual's program carefully so that he is not overwhelmed, and to attack the educational problem from the standpoint of the individual not the discipline.

Studies over the past decade indicate that colleges with substantial numbers of academically disadvantaged students are increasingly coming to the judgment that it is easier to deal with these problems with a comprehensive program. Estimates of the proportion of community colleges with such programs has risen progressively from 2 in 10 (Schenz 1964) to 3 in 10 (Ferrin 1971) to 4 in 10 (Morrison and Ferrante 1973). These latter surveys indicate that the new compensatory programs are placing a great deal of emphasis on basic skills, tutoring, intensive counseling, study skills, and individualized instruction.

Superficially, this represents a shift of emphasis from the recruitment/admissions/financial aid programs of the past decade (e.g., see Gordon and Wilkerson 1966; California Coordinating Council 1968; Trent 1970). Those access programs are still very much in evidence (for numerous examples, see College Entrance Examination Board 1971). It seems more a matter of the newer instructional development receiving more attention and, to some extent, the older access programs having become routine operational procedures. Each type of program supports the other, but the primary concern here is with the nature of the instructional program. It is useful to look a bit more carefully at what the most prominent of such programs typically include.

PROGRAM CHARACTERISTICS

In addition to sources already cited, there have been several excellent discussions of the desirable characteristics of a comprehensive compensatory program (Gordon 1971; Southern Regional Education Board 1972b; Schiavone 1973). One of the best known programs in the country was developed at Forest Park Community College; Moore's (1970) description is well worth a careful reading. Other prominent programs have been described by Chalghian (1969); Lopate (1969); Roueche and Kirk (1973). The following outline includes what seem to be the most important program characteristics from these various sources.

The curriculum often includes these components:

Credit work. Because of strong student resistance to noncredit work, most programs now attempt to include some credit work even for students with multiple deficiencies. A reduced load, however, is also a common practice.

Remedial work. Most students in compensatory programs require remedial work in mathematics and English. Distaste for noncollege work has fostered the practice of awarding limited credit (particularly institutional, nontransferable credit) for remedial courses. Some institutions handle the credit problem by imbedding remedial work in an individualized instruction program required of all students.

Communication skills. Basic skills – reading, writing, and speaking – receive close attention in most compensatory programs. See Pollack (1970) and Moore (1970) for illustrations of materials and procedures.

Study skills. Many students in compensatory programs have serious problems regarding self-discipline, use of learning resources, and the simple techniques of notetaking and organizing course materials.

Group guidance. Some systematic form of orientation and continuing counseling is a necessary program component. Often it is organized as a formal course, but in any event it usually includes provision for intensive attention to social and personal as well as academic problems.

Most programs emphasize the following instructional procedures:

Diagnostic-prescriptive. Successful compensatory programs typically place heavy emphasis on diagnostic and other procedures for obtaining detailed information concerning specific skills, attitudes, and knowledge of various subjects. On this basis correspondingly specific prescriptions are made regarding learning objectives.

Individualized instruction. Self-paced learning of specially designed course modules is now fairly common in basic skills, mathematics, and English.

Media. Self-paced learning is typically facilitated through heavy use of special materials, programmed texts, audio cassettes, computer-assisted instruction, etc.

Tutoring. Special help from faculty or other students is almost routinely available in compensatory programs. Some institutions have had striking success in training students for tutoring or counseling (see Southern Regional Education Board 1972b).

Learning centers. It is increasingly common to provide an accessible location where materials, instructional aids, testing, tutors, or counselors are always available.

Programs are likely to have such supporting features as:

Program identity. Identification as a separate unit focuses responsibility on specialized staff and fosters group spirit among students. Block scheduling serves a similar purpose in some programs.

Liberalized policies. Flexible regulations regarding academic probation and readmission are commonly emphasized to reduce the threat of early failure.

Special facilities. In addition to learning centers, some programs incorporate special social or living arrangements, though these are typically more associated with minority programs than compensatory education, per se.

Follow-up aid. Increasingly, programs are assuming a broader responsibility to see that students' educational experience culminates in a useful outcome—i.e., placement in a regular program, an appropriate job, or transfer to another learning situation (for example, see Moore 1970, p. 182).

SELECTION AND EVALUATION

In selecting students for a compensatory program, the primary concern is to identify "high risk" students who are likely to fail without intervention and special assistance. The appropriate selection procedure is the conventional prediction model, and the best tactic is to use those measures that give the most accurate estimate of the likelihood of overall academic success. One can undertake special studies to determine the best measures, but ordinarily it is not necessary. Most institutions have done studies to predict freshman grade average or other criteria of success. Almost invariably high school average (or rank) plus a standard college admission test predicts success about as well as more elaborate methods—and these are the measures that are typically used in identifying students who can profit from the compensatory program (Ferrin 1971; Roueche and Kirk 1973).

Some programs are mandatory for students so identified; some programs now place great stress on counseling the student into the program. In any event, it is important to recognize student selection as the first of a two-stage measurement process. The second stage involves the diagnostic testing that is required to prescribe specific instructional treatments (e.g., work in study skills, basic skills, or the remediation strategies discussed in Chapter 4).

While the selection procedure is fairly straightforward, evaluation of the overall success of a compensatory program is not. The simplest question is whether students in a compensatory program are more likely to persist and succeed than are similar students in a regular program. It takes a much more complex evaluation to decide whether the added value of a special program is worth added resources and time for students and for institutions.

In a sense the question is answered by the demands of the situation. The students are admitted to be educated, and it is often perfectly evident that they must have additional help. Undoubtedly many students succeed because of compensatory programs, but in a tight competition for scarce funds, the eventual question is whether one special effort is better than another, or whether a special program is significantly better than the regular program. Unfortunately, even the simplest type of evaluation is rare. Gordon and Wilkerson (1966) noted the lack of local program evaluations. In another review a few years later, Kendrick and Thomas (1970) cited a few studies in the interim but repeated the same observation. The situation has not really changed.

There have been useful reviews of research on special compensatory practices. For example, Entwisle (1960) examined 22 evaluations of study-skills courses and concluded that some kind of improvement in student achievement seemed to be the rule.[9] But the overall value of a comprehensive compensatory program is another matter. Roueche and Kirk (1973) considered a large number of programs in community colleges before selecting five apparently successful ones to examine in detail. Their report provides a very useful description of these programs and many perceptive observations on compensatory programming in general. But the evaluations are disappointing. The authors were able to report that students in compensatory programs made some three quarters of a letter grade higher than regular students during the first quarter when the special students were taking many remedial courses. Grades of compensatory students dropped some half a letter grade by the third semester. It was reported that 82 percent of compensatory students completed two semesters compared to 70 percent of high risk students in the regular programs. It is not clear, however, what percentage of each group completed the equivalent of two semesters of work beyond remedial courses. It would be equally useful to know what particular competencies and skills both groups had at the end of a year in college. It is answers to these more pointed questions that are badly needed in local evaluations.

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[9] In evaluating results like this it is difficult to judge the built-in bias that influences what appears in journals. Authors of studies that show no effect often don't submit the results to a journal; when they do, editors often don't publish the report.

6

Exemption from Requirements Already Mastered

College students matriculate with different preparation and competencies. Some pretty well know the content of freshman English. Others have mastered calculus, either in secondary school or another college. An older student may have studied American history on his own or learned accounting in his work. In order to adapt to such individual differences in competency, most institutions try to recognize appropriate prior learning and exempt the student from repeating material he or she already knows.

Exemption closely resembles placement in the sense that it involves sorting students into alternate treatments on the basis of subject-matter competency; an important difference lies in the nature of the treatments. Since placement involves a choice between a long and a short sequence, student achievement in the latter part of the sequence serves as a common criterion for evaluating placement decisions. But in exemption there is no common criterion; the alternatives represent whether or not a student is obliged to fulfill a requirement, be it a single unconnected course or an entire sequence. This lack of a common criterion means that exemption must be evaluated on the basis of long-range considerations rather than short-range achievement gains.

In placement one is concerned with such questions as: Is success in the second course of a sequence clearly dependent on knowing the first? How can one tell which students know enough to be able to go directly into the second course? How can one evaluate the gain from taking an introductory course? While in exemption, more pertinent questions are: For what types of prior learning should students be granted credit? Through what means can students' prior learning be verified? What limits should be placed on credit by examination? These questions illustrate an important distinction. In placement the main concern is to see that students take up topics that are appropriate to their level of understanding in the particular subject. Exemption, on the other hand, is more a problem of determining the conditions under which prior learning in other contexts will be recognized. Placement is an *instructional strategy*, but exemption is an *institutional strategy*. Consequently the basic policy issues concerning exemption are very much tied up with the relationship of the institution to other institutions and other learning opportunities. Or to put it another way, exemption is a primary means of maintaining articulation between higher education programs and other learning.

THE ARTICULATION PROBLEM

There are three main articulation problems: the traditional problem of articulation between secondary and higher education, the nontraditional problem of articulating higher education with alternate forms of college-level learning, and the problem of transfer articulation within the higher education system. It is useful to put these three in the context of their historical development and present importance. Understanding the articulation problem makes it easier to understand the rationale of exemption and to evaluate the appropriateness of exemption tactics.

TRADITIONAL ARTICULATION

The first 300 years of higher education in America followed a fairly consistent pattern. The classical curriculum consisted of ancient languages, natural philosophy (science), mathematics, and moral philosophy. Students prepared for this curriculum in schools attached to the college, through independent study, or more likely with a private tutor. Entrance examinations consisted of questioning in the office of the president or a professor (Rudolph 1962).

In the 1820s Thomas Jefferson introduced remarkable innovations at the University of Virginia. Recognizing the need for more diverse and practical higher learning, he set up independent professional schools in his university and initiated the elective system which was to become a hallmark of the college experience in this country. But these changes were some 50 years ahead of their time. It was only in the latter half of the nineteenth century that the college curriculum diversified in important ways and individual institutions began to develop different entrance requirements. It was also a period of development for preparatory academies in the northeast and public high schools in the midwest—both now independent of the colleges but much under their influence. The difficulty lay in the fact that the secondary schools could not prepare their students for increasingly diverse college requirements. In describing the articulation problems that developed in the period 1880-1900, Broome (1903) quotes the woeful complaint of the principal of Phillips Academy: "Out of over forty boys for college next year we have *over twenty senior classes.*"

At about the turn of the century there developed two forms of standardization to meet this articulation crisis. In the northeast a group of leading private institutions formed the College Entrance Examination Board as a cooperative arrangement for developing common entrance examinations. In the midwest public institutions developed accrediting associations that approved high school curriculums, and students were admitted to college on the basis of a diploma certifying successful completion of prescribed courses.

These procedures sufficed for some 50 years, but in time the content of entrance examinations became more general and unit requirements became less specific. As a result, high school preparation and the college freshman curriculum began to get seriously out of joint for many students. By midcentury the Fund for the Advancement of Education (1957) was calling high school–college articulation a major problem and initiated several large investigations and experimental programs. In the subsequent two decades this resurgent problem has become more complex and far-reaching. There are several contributing factors—some well established and some more recent.

First, there is the obvious fact of wide diversity among secondary schools. Large differences in student achievement from school to school have been documented in detail (Flanagan et al. 1962; Coleman et al. 1966). In his report on the American high school, Conant (1959) placed special emphasis on the striking differences among the rural schools and suburban schools, the schools of inner cities and those of small towns. Observing sharp differences among schools in pedagogical styles, and among the communities they serve, Conant took some pains to point out that "there is no such thing as a typical American high school." A variety of curriculum reform movements over the past 20 years (see College Entrance Examination Board 1962; 1966) have exacerbated these differences, partly because that is the nature of competing movements and partly because of the uneven character of curriculum change among different types of schools (Pearson 1966).

Second, diversity among schools is more than matched by diversity among colleges. This is true with respect both to the level and to the substance of the academic program. Information readily available in college guides illustrates the great diversity of intellectual ability of students at different institutions. For a substantial number of the most and least selective colleges, the distribution of entrance test scores is essentially nonoverlapping (e.g., see Willingham 1974). From a qualitative standpoint, a national survey by Dressel and DeLisle (1969) illustrates the curriculum diversity that exists, even in lower division general education requirements.

Third, there is the diversity of admissions requirements among higher institutions. It is generally conceded that the so-called "eight-year" study (Chamberlin et al. 1942) demonstrated decisively that a particular pattern of courses is not required for success in college. Furthermore, unit requirements are frequently criticized (Young 1971; Menacker 1973). Most colleges still recommend or require certain courses, but these specifications vary a great deal among colleges, and requirements are often not strictly observed (Educational Records Bureau 1964). Also the degree of specificity varies markedly from the selective to the free access colleges. Abramson (1972) presents data from the most selective institutions that he interprets to indicate rigid unit requirements for admission. At the other extreme, it is well-known that community colleges typically require only high school graduation or its equivalent.

Fourth, there is a substantial amount of anecdotal evidence concerning the overlap of curriculum content between secondary and higher education (e.g., Casserly 1968). The most objective information comes from a survey by Blanchard (1971) who estimates that approximately one-third of the content of lower division academic subjects represents a duplication of material already taught at the secondary level. This overlap seems due to more rapid curriculum development at the secondary level than in introductory college courses. For example, a survey of 25,000 students who had taken the College Board Achievement Tests (typically students from strong schools) indicated very heavy concentration of mathematics, science, and foreign language through all four years of secondary school (Haven 1970). As Haag (1973) argues, greatly strengthened secondary curriculums have made many entering freshmen de facto transfer students (without portfolio).

Fifth, the advent of mass higher education has introduced a quite new dimension to the articulation problem. Open admissions and the egalitarian spirit have added large numbers of students whose preparation necessitates remedial work or alternate educational objectives. Many faculties now must cope with a far broader range of competency than was recently true.

Finally, even the structural arrangement of increasingly massive yet divided systems of secondary and higher education insures articulation problems. As Boyer (1972) observes, the educational system is like a giant layer cake, with each level preoccupied with its own problems, and no one giving attention to the educational continuity of the whole. Other writers speak with equal fervor of the "sheepskin curtain" that precludes effective articulation or mutual consultation on curriculum problems across the two educational levels (Hochman 1968; Abramson 1972).

These various manifestations of the traditional articulation problem are almost as much related to placement strategies as to exemption strategies. The overall articulation problem is discussed in this chapter on exemption because articulation is largely concerned with relationships among institutions and exemption is largely an institutional strategy. But when relationships between schools and colleges cause discontinuity in natural sequences like mathematics, instructional problems in placement are also created. Consequently, much of the foregoing discussion is equally pertinent to Chapter 4.

As the name suggests, the traditional articulation problem is not new. Since World War II educators have tried various ways of dealing with the problem—sometimes through structural changes, sometimes through examination programs. The better known innovations are described briefly later in this chapter. Overall, it is hard to say that the effort has been successful. While there have been important advances, very recent developments in higher education have made the traditional articulation problem doubly difficult to handle.

The early 1970s have been characterized by intense interest in finding ways to improve the flexibility of higher education, to create more options, and to adapt the college experience to the background and aspirations of individual students. These stirrings are well represented in recommendations of the National Commission on the Reform of Secondary Education (Brown 1973) and the Carnegie Commission on Higher Education (1970; 1971). The former group recommends a move away from the Carnegie unit as the standard yardstick of academic credit, more credit by examination, more credit for experiential learning, and less reliance on grades and rank in class as means of assessing a student's education. The latter group has called for an individually tailored foundation year for poorly prepared college students, for high schools to take on college freshman work, and for colleges to admit students with advanced standing and to transform the first year of college to meet their actual needs.

These various recommendations are laudable and sound in their own right, but they enhance already serious articulation problems. Evidently those pushing flexibility also recognize that such innovations greatly heighten the need for effective means of assessing individual achievement and maintaining educational quality. The Carnegie Commission (1973) hopefully states: "Fortunately, the major testing organizations are well aware that the traditional hard and fast distinctions between school and college programs are blurring and that universal access calls for a much more sophisticated process of student placement than has been the case until the present."

NONTRADITIONAL ARTICULATION

The Organisation for Economic Cooperation and Development (OECD), based in Paris, has a distinguished reputation for dealing with practical social problems of major significance. In a recent conference report OECD's Centre for Educational Research and Innovation (1972) identified important trends in education, including the following: extension in the duration of the educational period, both through early-childhood education, and through more education for adults; increasing involvement of education with, and functional relationship to, other social institutions; extension of education to industry, community, and home; a concurrent rather than a sequential arrangement of education and work as we move into "the learning society"; increasing blurring of the distinction between vocational and academic education.

The immediate importance of these trends is reflected in major proposals of several prominent groups. The Carnegie Commission on Higher Education, for example, cites the need to move toward a "learning society" in which nontraditional students will likely represent a greater share of the educational clientele than is now true. It proposes more alternating among education, work, and service; extension of educational opportunities in industry, trade unions, and the military; the creation of "learning pavilions" where people can drop in to study and discuss their studies; and development of open universities and other external degree programs (Carnegie Commission 1973b).

The Newman Task Force (1973) has stressed the isolation of formal education and argues that the great need is to provide a context for experience in the adult world, not by modifying classrooms, but by offering youths other places and other roles in which they can supplement their formal schooling. As an attack on this problem, it has proposed a community-service G.I. bill that would encourage more students to learn through nonclassroom experiences. Many of the same issues have been recognized by the National Commission on the Reform of Secondary Education (Brown 1973). That group recommended "extensive programs to award academic credit for accomplishment outside the building, and for learning that occurs on the job, whether the job be undertaken for pay, for love, or for its own sake."

These various proposals refer to what is now typically called nontraditional education, actually a broad movement for reform and innovation. *Diversity by Design*, the report of the Commission on Non-Traditional Study (1973), gives a good indication of the diversity of the movement. It emphasizes new procedures and structures to improve access to education for people of all ages, new programs to fit education to individual interests and career needs, and new ways to integrate formal schooling better with the learning that takes place throughout society. It is this latter emphasis with which this report is especially concerned: how to articulate learning that takes place without and within the educational system, how to credit students for what they have already learned or accomplished outside the college classroom.

As more older people reenter colleges, as more younger people "stop out" for alternate experiences, as more educational value is placed on practical experience, it can be expected that more and more students will seek credit for knowledge and accomplishments gained in nontraditional contexts. Various writers have estimated that there are far more adults involved in part-time educational activity than there are students in all higher education. For example, Carp et al. (1974) estimated that some 32 million adult learners receive instruction each year. Most are not in college-level programs, but many are. Examples include: educational programs in the military service, industrial courses in major corporations, certificate programs in various professions, instruction in proprietary schools, courses on public television.

These types of nontraditional learning occur outside higher education, but they often correspond fairly well to conventional coursework. As a consequence, these types of prior learning are well suited for credit by examination (see Sharon 1971 for a review of the major ways such work is credited). But there is another general class of nontraditional learning that is substantively different—

what might be called prior *experiential learning*. For example, a great many adults can claim special accomplishments and individual experiences like: extensive tutorial work in a community program, several years of volunteer social work, articles published in popular magazines, work experience related to a degree program, executive leadership in a community group or occupational association.

The educational value of these accomplishments and experiences is not readily verified through examinations but requires alternate means of assessment that are referred to later in this report as documentation. The proposition is that both types of nontraditional learning should be more explicitly recognized in higher education and that students with such experience should have ready means for receiving appropriate exemption and credit toward a degree. In actual fact, most colleges grant credit by examination, and many have taken steps to recognize at least some types of prior experiential learning (see Creager 1973; Ruyle and Geiselman 1974). But as institutions take an increasingly liberal view of what constitutes creditable learning, legitimate fears are aroused. Gould (1972) states it well:

"The greatest doubt of all, a doubt coupled with outright disbelief, is centered on whether a set of patterns for nontraditional study can be created that will guarantee high quality in education rather than dilute it. The terms *external degree* or *individualized learning* or *patterns of flexibility* have a suspiciously permissive ring, especially in the ears of traditionalist educators and a host of laymen as well, who consider current philosophies and practices of colleges and universities already too liberalized and weakened. They hear these terms and others, and they are convinced that every vestige of intellectual rigor will disappear into oblivion if the non-traditionalists gain any significant control of higher education. They sense a further proliferation of degree-granting under dubious auspices and with dubious requirements. They interpret individualized learning as individualized isolation, especially from faculty, and they look on flexibility as no more than a synonym for escape from regulation and responsibility."

Effective articulation between traditional and nontraditional education requires effective means for assessing and crediting relevant prior learning. This involves three big issues. The first is how to decide what is creditable. Certainly not all learning is relevant to a college degree. This is partly a fundamental issue of defining what a degree should mean, what competencies it should imply. There is also the matter of identifying what competencies have been gained in a nontraditional experience that are "the same as or as good as" traditional learning.

The second issue is how to develop and maintain adequate means of assessing learning experiences that are gained outside the formal educational system. Many such experiences are obviously difficult to assess accurately. Specific examinations cannot be developed for every learning experience. Consequently, assessment of nontraditional learning – particularly experiential learning – may often be partly subjective. Nonetheless, careful evaluation is critical in order to maintain both the quality and the integrity of nontraditional learning.

The third issue is how to develop effective procedures for exempting and crediting students for nontraditional work. What minimum standards should be set? How should equivalencies be established between credit hours and particular competencies or accomplishments? And how can such questions be handled routinely (economically) but fairly in the existing academic and administrative structure? The need is for an efficient and equitable system to handle a new problem in an old context.

These three issues frame the nontraditional articulation problem. In short, the need is to develop better definitions, measures, and procedures for recognizing relevant work completed outside the formal educational system. In the absence of commonly understood practices and guidelines, many fear the development of bogus programs and a deterioration of quality generally (see especially Hefferlin 1974; Bender and Davis 1972).

TRANSFER ARTICULATION

A problem of articulation within the system of higher education is created by the movement of students from one institution to another. In recent years this form of articulation has grown in importance for two reasons. First, there is an increasing movement among four-year institutions because of greater mobility of the population than was formerly true. Increasing emphasis upon adult reentry and continuing education promises to swell further this form of transfer. Second, there is the systematic development of community colleges, which now enroll almost half of all new freshmen. The two- to four-year transfer problem is not merely a matter of numbers; it represents a planned structural arrangement that necessitates transfer and depends upon successful articulation.

In addition to the problem of recognizing prior achievement, transfer articulation involves many complex issues that lie beyond the scope of this discussion (e.g., educational guidance, student financial planning, curriculum continuity, transfer admissions standards, etc.). Because of increasing concern over transfer articulation issues, a working conference on transfer problems was organized by an informal federation called the Association Transfer Group.[10] The conference report (Association Transfer Group 1974) plus several other general references provide a detailed discussion of these and other matters only mentioned here (see Knoell and Medsker 1965; Willingham 1972; Kintzer 1973). For the purposes of this discussion, the critical question is how one college handles credit granted by another college.

In the simplest view, students should receive full credit in one college for work done in another. There are various reasons that the simple view does not always hold. For one thing, transferring students often change programs at the same time, and this usually creates credit problems. Also, a plural system of higher education automatically means that individual colleges have their own educational objectives and their own views of what constitutes creditable work toward a particular degree. Even when previous credits seem to match required courses, they may be disallowed because of questionable correspondence of content. Or credit may be denied because of doubt that the student has adequate command of the subject – because of a low grade or a lengthy absence from higher education. And there is the frequently unstated reason – presumed inferiority of the other institution.

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[10] Members of the Association Transfer Group include: American Association of Collegiate Registrars and Admissions Officers, American Association of Community and Junior Colleges, American Association of State Colleges and Universities, American College Testing Program, American Council on Education, Association of American Colleges, College Entrance Examination Board, Educational Testing Service, Federal Interagency Committee on Education, and National Association of State Universities and Land-Grant Colleges.

There are very different conditions under which students transfer; these are characterized by different problems that require different solutions. Willingham (1974) described seven types of transfers, but the most important distinction is between: (1) those students transferring between a two- and four-year institution within a state system and (2) those students transferring between four-year institutions. In the late 1950s it was recognized that transfer from junior to senior colleges would become a transition problem of major importance in higher education. The Knoell-Medsker study laid the groundwork for articulation guidelines that helped to establish policies and minimize artificial barriers to such transfer (Joint Committee on Junior and Senior Colleges 1966). The important effect of those guidelines was to establish firmly the principle that transfer articulation between junior and senior colleges would be handled through coordination, planning, and joint agreements among institutions (see Wattenbarger 1972 for an exemplary articulation model and Kintzer 1973 for a state-by-state review of articulation procedures).

With respect to recognizing achievement and transferring credit, articulation agreements can be regarded as a form of certification. Thus, students from junior colleges are credited for individual courses, course packages, or all lower division general education requirements on the basis of established policy rather than direct validation of knowledge in individual cases. General impressions indicate that such systems can work satisfactorily, though there have been few systematic studies and articulation is poorly developed in many individual states. One special problem much in need of investigation is the unanticipated but substantial reverse transfer from four- to two-year colleges.

Movement from one senior college to another is a basically different form of transfer. Too often such transfer has been regarded merely as evidence of educational indecisiveness. There are undoubtedly many students lacking in serious purpose or unsure of their career interests, and it is desirable to accommodate such students insofar as possible. But there are large numbers of students at senior institutions who are just as surely required to transfer as are the community college students who seek B.A. degrees. Many women marry, drop out of college, and relocate wherever their husband's job takes them. Many servicemen, and civilians as well, are committed to a career of frequent moves (see Furniss 1971 for a telling tale of Sergeant X). Many young students find it impossible to commute to the same college when their parents move. Thus millions have no option. If they want to continue their education, they have to transfer.

Transfer between four-year institutions presents a variety of problems. Perhaps the most frequent complication is the registrar's unfamiliarity with the curriculum or grading system at the previous college. Stevens' (1973) survey, for example, indicates that the majority of institutions are hesitant to accept pass-fail grades for transfer credit. Transfer may also involve program changes, academic difficulty, or an extended period between enrollments. All these circumstances contribute uncertainty to the process of evaluating prior work for degree credit. In general, credit for prior work hinges on accreditation status, but accreditation is only the first and often an insufficient criterion.

Because of differences in institutional objectives, grading systems, variation in similarly named courses, and uncertainty regarding a transfer student's actual competencies, it is often difficult to translate a transcript from an unfamiliar institution into an equitable and sound degree program at another institution. In such circumstances most faculties take a liberal view of what constitutes generally comparable courses and requirements, but other information about the student and his education are often brought into play. In cases that are difficult to handle fairly, it is reasonable to expect that placement tests can help to put students in appropriate courses and that achievement tests covering broad subject areas can help to validate a record that is otherwise difficult to assess.

THE RATIONALE OF EXEMPTION

In the foregoing discussion three types of articulation problems have been identified: articulation between secondary and higher institutions, articulation between higher institutions and other forms of learning, and articulation among higher institutions. There are various ways one could think of articulation that have little to do with the current discussion; e.g., articulation with respect to the service or research functions that colleges might serve. The concern here is with curriculum articulation—a problem that stems from substantial overlap between what a particular institution teaches and what its incoming students may have learned somewhere else.

The general assumption here is that articulation refers to the fact that comparable learning in one situation should be recognized in another and that administrative relationships among learning contexts should not be so disconnected that students moving from one to another must approach their educational goals de novo. The position here is that *exemption is the basic mechanism for maintaining articulation in the programs of individual students who move about within the larger education system and, as a corollary, such articulation is the basic function of exemption.*

It is useful to consider what that means in a bit more detail. Specifically, the next few pages: (1) outline some specific objectives and expected outcomes of exemption; (2) clarify the role of credit and alternate meanings of exemption; (3) outline three basic mechanisms that are used to verify the prior learning that qualifies a student for exemption.

OBJECTIVES OF EXEMPTION

There are several fairly specific objectives or desirable outcomes that are served by exempting students from requirements already satisfied in a prior situation. The five objectives or outcomes outlined below affect students directly and, to varying degrees, influence the effectiveness of institutions and educational systems generally.

Continuity. The most important objective is the obvious one of recognizing what the matriculating student knows. This means helping the student maintain continuity toward an educational objective rather than arbitrarily requiring repetition of work simply because it was learned in some other context or because it differs in some respect that is likely not really critical in the context of an overall educational goal. It is partly a matter of equity and partly a matter of avoiding the boredom and discouragement that needless coursework is likely to entail. In either event the primary function of exemption is to facilitate systematic progress of individual students.

Transportability. American education has always taken great pains to avoid a standardized curriculum, but diversification creates a problem of transportability. An educational system that operates as a system must have a common academic currency that transcends the potential parochialism of an individual course or learning auspice. Another important objective of exemption, then, is to insure that credit for learning is not bound to a particular situation, and that movement of students is facilitated within the total learning society.

Opportunity. Exemption fosters educational opportunity in several ways that are related to continuity and transportability. Adults are encouraged to reenter education by the knowledge that their experience will be taken into account, that they will not be automatically expected to proceed like eighteen-year-olds just out of high school. Transportable credit also extends educational opportunity by encouraging use of local or nontraditional educational resources that are more accessible to individuals who are institutionalized, not within easy commuting distance of a college, tied down by a family responsibility, and so on.

Integration. A subtle but important objective of exemption is to encourage faculties to give careful attention to what types of learning—particularly nontraditional learning—should be recognized. The effects are to clarify the nature of the college degree and what it means in relation to other social institutions; to narrow the gap between education and adult life; to achieve some crossfertilization between these two with respect to desirable learning outcomes; and to improve the long-term usefulness of education to career, leisure, and service interest.

Efficiency. An important objective of exemption in the minds of many administrators is to conserve resources by not requiring students needlessly to repeat courses in which they are sufficiently competent. Teachers are more inclined to worry that students and faculties may be short-changed in the process. The desirability of conserving resources and the potential dangers in overdoing it both urge close attention to exemption policies and practices. In the name of economy, exemption has already witnessed some excesses; it has also inspired some criticism that seems partly due to inflexibility.

Earlier, exemption is referred to as an institutional strategy—particularly to differentiate it from placement, which is more an instructional strategy. The institutional emphasis in exemption is perhaps clarified by the objectives just outlined. When an institution exempts students on the grounds that some degree requirements have already been met, the institution says something about its objectives, its relationship to other institutions, and its role in the larger educational system. An institution's exemption policies can have an important bearing upon the sort of students it serves—particularly whether it encourages transfers, older students, students from innovative programs, and so on.

Clearly, exemption can also involve a reallocation of resources from one learning context to another, and influence the flow of students, and change the balance of income and expense at a particular institution or within a system. It is in this context that institutions approach the question of which students should be exempted from what. These issues are addressed later, but to complete the overview here there follows a consideration of what general types of exemption there are and the principal ways institutions can verify a student's prior learning.

CREDIT AND THE MEANING OF EXEMPTION

Recognizing prior learning through exemption is not simply a yes-no proposition. There are different types or models of exemption that revolve around the question of whether and to what extent credit is granted toward a degree. Since degrees are normally defined as an accumulation of credits, the real meaning of exemption naturally depends on what type of credit is involved. Several writers have provided useful discussions of how the credit system developed and what functions it serves (Lewis 1961; Kreplin 1971; Warren 1974). Without going into detail, it is worthwhile to outline several aspects of college credit that have been frequently noted.

First, it is important to appreciate that a college credit is an arbitrary unit with limited meaning. Quantitatively, it is arbitrary in the sense that credits represent small pieces of the four-year degree and there is no accepted rationale for that time requirement other than custom. Qualitatively, it is arbitrary in the sense that all students receive the same credit for meeting minimum standards regardless of how much they actually know. The credit system is criticized by some because it resists educational reform and places too much emphasis on the time-serving character of the college degree. Nonetheless, the credit unit is useful within institutions for educational accounting and marking student progress; between institutions it serves as a common academic currency.

There are several ways a college can treat evidence of prior learning: it may or may not waive a requirement; it may or may not grant credit. Following are six possibilities to be considered.

1. Nondegree credit may be awarded in recognition of work completed at a lower educational level but not creditable toward a degree at the level in question. For example, a Continuing Education Unit may apply to a certificate but not to an associate degree; a vocational course may apply to an associate degree but not to a B.A.; and so on.

2. General education units may be freely transferred from another institution (as "book credit") but made meaningless by compelling the student to repeat courses. This means of recognizing learning, as well as (1) above, does not constitute exemption in the present context because neither actually involves waiving a requirement; i.e., in neither case does receiving or not receiving

credit have any effect on the student's program.

3. Substituting one requirement for another is a form of exemption if the substitution is based on evidence that the student already knows the content of the waived course. This ordinarily involves substituting a parallel (usually enriched) course without granting any credit for the course waived. This rather special and weak form of exemption is subsequently discussed as *Model 9: Horizontal Sectioning*.

4. Waiving a specific course requirement is another form of exemption. Credit toward a degree is often granted but may not be. If credit is granted, then presumably time is saved. If credit is not granted, units needed for graduation are not thereby reduced, but the student can substitute a more useful elective. The distinction between credit and no-credit is acceleration versus enrichment. Either way, this form of exemption is referred to here as *Model 10: Course Exemption*.

5. Many institutions offer substantial amounts of credit by examination for general education requirements *(Model 11: Advanced Standing)*. Such exemption is based on established policies or formulas whereby evidence of knowledge in broad fields serves as a basis for granting varying amounts of credit not directly associated with specific courses.

6. A recent movement in higher education is to define a college degree in terms of particular competencies rather than credits earned. Thus, checking off competencies acquired before enrollment is, theoretically, an important form of exemption discussed later as *Model 12: Recognizing Competence*.

THREE WAYS TO VERIFY PRIOR LEARNING

At present there are two principal means whereby institutions verify a student's prior learning—accreditation and examination. A third, which might be called documentation, is now developing. In the following paragraphs all three are briefly considered, but for reasons that will become obvious the remainder of this chapter will concentrate on the examination as a means of exemption.

Accreditation. Perhaps the simplest way to recognize and transport formal classroom learning is to certify that the course (or program or institution) is reputable and maintains such standards as to give reasonable assurance that students who have passed the course do, in fact, know the material. In large measure this is the mechanism through which most transfer credit is recognized. In actual practice, of course, it is more complicated.

Institutions accept credit from accredited colleges, but they often hedge the recognition, depending on the presumed quality of the previous institution and the grade the student received in the course. Also there are shades to accreditation status. An annual report from the American Association of Collegiate Registrars and Admissions Officers indicates how major state universities in each state handle transfer credit for each of the unaccredited or not yet accredited postsecondary institutions in their area (Windsor 1973). This guide is widely used in credit evaluation when colleges receive transfer applicants from such institutions.

The Commission on Accreditation of Service Experiences (CASE) represents another means of exempting students for work undertaken before enrollment. CASE evaluates formal educational programs of the armed services (including the United States Department of Defense and the United States Armed Forces Institute) and makes recommendations regarding interpretation of course content and credit that might be appropriate. In this sense students receive credit for college-level work because they have successfully completed an accredited course. Bulletin No. 8 (CASE 1968) describes this program; a handbook edited by Turner (1968) is the primary means for disseminating its work. CASE is planning a major extension of this service to formal coursework in business and industry (CASE 1973).[11] Theoretically, this means that most formal college-level instruction occurring outside higher institutions could be exempted through the CASE mechanism of accreditation. This is a significant step forward though in actual practice much of the instruction and learning that go on in business and industry are not so organized as to make accreditation an efficient way of handling the exemption problem.

Finally, there are local or statewide agreements among institutions that have the same effect as accreditation with respect to recognizing prior learning. There are extensive and diverse articulation agreements between pairs of colleges or within systems that are designed to facilitate transfer and insure educational continuity. For example, institutions draft agreements whereby a sending college verifies that a student has completed the first two years of a B.A. degree, or broad core requirements of the lower division, or specific parallel courses. Then the receiving college recognizes these credits without question (see Kintzer 1973 for detailed descriptions of various models).

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[11] In recognition of this broader mission CASE has changed its name to Commission on Educational Credit.

Accreditation is a principal means of recognizing prior learning, though it is not given further attention here, partly because it is a complex and major topic in its own right. But mainly accreditation falls outside the scope of this review because it does not involve assessing individual differences in competency and assigning students accordingly. It rather emphasizes program evaluation and institutional agreements.

Obviously there are limitations in the extent to which accreditation can be used as a mechanism for transporting credit and exempting students for work previously accomplished in some other context. It is impossible to accredit every possible learning activity. Furthermore, the substance and quality of recognized programs vary a great deal. Often the best way to determine what a student knows is to assess it directly. Most formal higher education is based on a fairly well-understood body of knowledge, understanding, and skill. Examinations are the traditional method of determining whether the student has mastered the material sufficiently well to receive the recognition that mastery is due.

Examination. In recent years educators have increasingly come to the opinion that students should not be held to course attendance if they are already able to pass an examination covering the content of the course. This is not a new idea. Tests of General Educational Development has been well established for some time as a routine method of earning a high school diploma (Kenefick 1956). And many years ago institutions like University of Chicago and Michigan State University developed extensive programs of credit by examination. Undoubtedly, the majority of higher institutions have long made provision for students to take challenge examinations in particular courses or departments. But an external examination program to facilitate the recognition of college-level learning regardless of where it takes place is a relatively new idea.

There are a number of nationally available examinations that can be used for exemption. Kimmel (1972) and Sharon (1971) have provided brief reviews of various programs and special purpose examinations used for exemption. Buros (1972; 1974) edits the standard references that regularly list all published tests including professional reviews of most. There is no effort here to describe types of programs and examinations that are well documented elsewhere, but it is useful to mention three programs that represent progressive models of credit by examination.

The *Advanced Placement Program* of the College Board was a breakthrough of the 1950s. This was the first successful national effort to use college-level exemption tests as a means of improving articulation between secondary and higher education.[12] The program includes combination essay-objective tests in 13 subjects that are used to verify college-level work completed in special high school courses. Despite the name, it is more an exemption than a placement program in the terms of this review. Despite Conant's (1959) recommendation that all comprehensive secondary schools should try to offer AP work, the program has remained selective – in 1974 only 78,000 students took the AP Examinations. But its influence and impact have been far greater than those numbers suggest. The success of the AP Program changed attitudes and made CLEP possible.

CLEP is the familiar acronym for the *College-Level Examination Program* – a development of the 1960s. It consists of a number of objective Subject Examinations with optional essays and five General Examinations covering general education typically represented in the lower division of most colleges. CLEP examinations are designed by subject specialists from representative colleges and universities; norms are based on a national sample of college sophomores (College Entrance Examination Board, 1973; 1973d). The examinations are administered regularly in centers throughout the country and at military bases abroad. Many colleges also offer special administrations to give their students an opportunity to earn credit by examination.

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[12] For a period after World War II there was a college-level version of the Tests of General Educational Development that received limited use, mostly in the armed services (Kenefick 1956).

A third stage of development occurred in the 1970s when the first degree programs in this country were explicitly organized on the principle of credit by examination.[13] For example, the College Proficiency Examination Program was developed by the New York State Department of Education primarily to serve students in that state. The program is similar to CLEP, but the unique aspect of CPEP is the fact that credit gained on its examinations can apply directly to a Regents External Degree (University of the State of New York 1971; 1972). The program has no admission requirements, no residency requirements, and offers no classroom instruction. Thus CPEP evolved into a living example of the degree by examination suggested by several (Pifer 1970; Solomon 1970) and a potential forerunner of the "national university" outlined by Arbolino and Valley (1970) or the regional examining universities prescribed in some detail by the Newman Task Force (1973). The external degree takes on every shape and character imaginable. The Regents External Degree is only one model; Houle (1973) and Valley (1972 and 1972b) describe a variety of others. Most tend to use credit by examination freely. And as Ruyle and Geiselman (1974) report, many colleges are now willing to offer a degree on the basis of examinations alone.

Local as well as external examination programs have become a common feature of higher education, and they do provide recognizable standards in a time of increasing flexibility and diversity in curriculums and teaching. But credit by examination raises a variety of practical and technical issues unfamiliar to many educators – issues concerning how such examinations should be designed and validated, how norms can be developed, how standards can be set. These issues are discussed in the following section on "exemption tactics."

Documentation. The nontraditional movement stresses alternate forms of education that differ from traditional higher education in two respects. One is flexibility in the conditions of learning – what Summerskill (1973) calls "time-free, space-free" education.

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[13] This is not strictly true if one considers a few special programs within institutions that have built-in arrangements for satisfying all requirements by examination. For example, Kreplin (1971) cites the availability since 1959 of teacher certification by examination at the University of Wisconsin. And degrees by examination have been offered by some foreign institutions like University of London for more than a century.

This involves recognizing the formal education that takes place in business, industry, and military; encouraging the use of new educational media; and facilitating self-instruction. These nontraditional adaptations are well served by credit by examination because it frees conventional education from conventional boundaries.

But nontraditional education also proposes to reform the content of education. As noted earlier, there is particular emphasis on improving the connection between higher education and major elements of adult life: work, leisure, and service. Consequently, increasing importance is attached to experiential learning. Many colleges have revised their curriculums to include more work experience, community service, internships, etc. Many are now making a systematic effort to grant credit for similar experiences gained before enrollment—and here lies an exceedingly complex assessment problem.

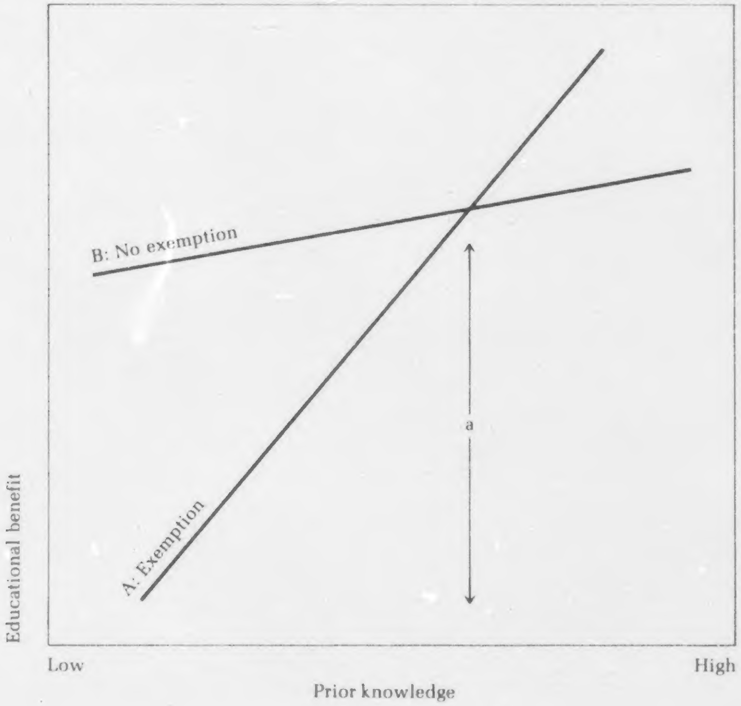
The learning has already taken place so there is no possibility of faculty planning or supervision. Furthermore, experiential learning often places more stress on performance as opposed to conceptualizing—on applications that enhance the understanding of theory. The objectives of such learning are typically concerned with producing something, developing interpersonal skills, learning to work effectively in a career related situation, etc. Traditional tests are usually not appropriate to assess such competencies, which rather require systematic documentation: evidence of accomplishment, expert testimony, supervisory ratings, direct performance evaluation, and so on.

Verifying the educational value of prior experiential learning is an almost totally new problem for higher education. An informal survey of several hundred institutions indicated that very little systematic thinking has been directed to such assessment and each college tends to approach the problem in its own way (Ganzemiller 1973). A concerted attack on the problem has been initiated under the aegis of the CAEL Assembly (Cooperative Assessment of Experiential Learning—Educational Testing Service et al. 1974), but at this writing there is very little in the way of research literature or developed assessment methods that can be usefully discussed.

EXEMPTION TACTICS

It is not possible to quantify precisely the advantages and disadvantages of exemption, either in establishing institutional policies or deciding on individual cases. This is because exemption involves subjective matters like faculty values, institutional image, long-range educational merit, and student attitudes. But institutions do have to grant exemption in a manner that is consistent, rational, and beneficial. Figure 15 illustrates the problem in the same decision framework used in earlier chapters.

FIGURE 15: Hypothetical relationship between the student's prior knowledge and the benefit of exemption



Line A indicates that the greater the student's prior knowledge of a subject, the more benefit there is in exempting him. The reasons are obvious – students who already know the subject profit more from other courses, save time and money if exempted, form a more positive view of their studies and their institution, and so on. Students who have not mastered the subject benefit from taking it (line B), but with greater prior knowledge such potential gain diminishes and tends to be offset by the direct and the intangible costs of repetition. Moving from low knowledge to high knowledge, a hypothetical point "a," is reached. Beyond this point there is greater benefit in exempting students than in requiring the course.

This decision strategy is subjective because of the complex nature of the situation, but it includes the same basic questions that were involved in assignment, placement, and selection: how to define the measure of knowledge, and how to decide at what point on the scale students know enough to be exempted. If standards are set too high, the educational programs of many students are poorly articulated; if standards are set too low, the value of the educational experience is generally weakened. If the content of the exemption measure is invalid at the outset, both of these undesirable effects can occur. These two issues – content and standards – pretty well frame the main questions concerning exemption tactics. In the following pages the content questions are considered under two headings: content validity and empirical validity. Questions concerning standards suggest two additional topics: normative standards and criterion standards. A sizable research literature has developed on exemption in recent years. In the following sections there is no effort to cite all the individual studies that might be pertinent. Table 5 identifies a number of such references. Dressel and Schmid (1951) and Flaugher et al. (1967) are good references to earlier work.

CONTENT VALIDITY

The whole idea of an exemption test is to find out whether a student already knows the material covered in a course of study. So it makes perfectly good sense that the first and most important question about the examination is whether it does adequately cover the appropriate information, understanding, and skills. From one standpoint one might say that the best exemption test would be a good final examination for the course in question, or perhaps a comprehensive examination like that required by some colleges at the end of the sophomore year. When offered to students who have not taken the courses covered, such examinations have often been called challenge examinations. This has been a common practice, possibly because it offers little disturbance to existing procedures, but on most campuses few students have earned much credit in this manner.

Only brief reflection reveals the shortcomings of this conventional approach to exemption. Most of the objectives of exemption discussed earlier in this chapter suggest that an exemption test must have general applicability beyond a particular course in a particular institution. If one wishes to facilitate educational continuity, to promote transportability of credit, to encourage access to education, it is necessary to take a liberal view of what constitutes generally comparable educational experiences. Thus if an exemption test follows the content of a particular course or curriculum too closely, it is not likely to be fair to individual students who have worked hard on a somewhat different but perhaps equally good syllabus – nor is the test likely to be functional for the general purpose of improving articulation. As Braddock and Enger (1973) put it: "An equivalency test should not be considered as if it were the final exam for a particular course at a particular institution but as an examination which a student, from any institution, who is competent in the area would be expected to pass. No student should be expected to know the answer to every question in an equivalency examination, designed to cover material from a variety of similar courses."

Content validity places great stress on the judgment that goes into the construction of an examination and on the judgment that is involved when potential users evaluate its content. A useful booklet called *ETS Builds a Test* (Educational Testing Service 1970) describes how representative committees of subject-matter specialists work to prepare tests that are fair with respect to different curriculums in different colleges. In some cases rather extensive national surveys are required to determine the most equitable representation of topics in a particular test (e.g., see Moore 1965). After the test is constructed, other groups must judge how well it represents the subject and how well it fits the curriculum at a particular

TABLE 5: References to exemption studies identified according to four topics: surveys of institutional policies, normative standards, validity, and descriptions of individual college programs

REFERENCE	LOCATION	Institutional policies	Normative standards	Validity	Program descriptions
Aleamoni 1972	National	x			
American College Testing Program 1972	National	x			
Angell and Bailey 1972	Calif. State System		x	x	x
Auger 1969	U. Colorado			x	
Barnette 1957	U. Buffalo			x	x
Beanblossom 1969	U. Washington		x	x	
Beanblossom 1969b	U. Washington			x	
Braddock and Enger 1973	U. Iowa				x
Brittain and Carper 1971	National	x			
Brubacher 1968	U. Michigan			x	
Burnette 1970	Fla. Southern		x	x	
Burnette 1971	Fla. Southern				x
Burnham and Hewitt 1972	Yale			x	
Casserly 1966	National	x			
Casserly 1968	National			x	
Casserly 1973	National			x	
Checketts and Christensen 1974	U. Utah			x	
Cohen and Whitney 1973	U. Iowa		x		
College Entrance Examination Board 1968	USAFI			x	
College Entrance Examination Board 1973	National		x	x	
College Entrance Examination Board 1973b	National	x			
College Entrance Examination Board 1973c	National	x	x		
College Entrance Examination Board 1973d	National			x	

REFERENCE	LOCATION	Institutional policies	Normative standards	Validity	Program descriptions
Commission on Accreditation of Service Experiences 1970	National	x			
Commission on Accreditation of Service Experiences 1972	National		x		
Creager 1973	National	x			
Crews 1969	Columbia Col.		x	x	
Demitroff 1969	U. Iowa				x
Dressel and Schmid 1951	National			x	
Fagin 1971	U. Missouri			x	
Fagin 1971b	U. Missouri				x
Feldman and Kane 1973	U. Illinois		x	x	
Ferrin and Willingham 1970	South	x			
Fowler 1971	U. Utah			x	
Ganzemiller 1973	Midwest	x			
Goolsby 1966	Fla. State			x	
Goolsby 1970	Fla. State			x	
Hanson 1973	U. Utah		x	x	x
Harris and Booth 1969	Georgia Col.		x	x	
Harris and Hurst 1972	Georgia Col.			x	
Haven 1964	National		x	x	
Hodgson 1970	U. Washington			x	
Kelley 1973	U. Texas		x	x	
Kenefick 1956	National			x	
Krauskopf 1964	U. Missouri			x	
Leech 1969	U. Pittsburgh				x
Losak and Lin 1973	Miami-Dade			x	
McCluskey 1972	Arkansas State				x
McKean 1972	U. Utah		x	x	x
McKean 1972b	U. Utah				x
Merritt et al. 1972	Illinois	x			
Moore 1965	National	x			

Table continues on following page.

REFERENCE	LOCATION	Institutional policies	Normative standards	Validity	Program descriptions
Morris 1964	N. Texas State			x	
Moye 1969	Boston U.				x
Oregon Daily Emerald 1972	U. Oregon				x
Peterson 1966	National	x			
Radcliffe and Hatch 1961	–				x
Reich 1971	Dallas				x
Richards 1970	–			x	
Ruyle and Geiselman 1974	National	x			
Sharon 1970b	–			x	
Sharon 1971b	–			x	
Sharon 1972	National			x	
Southern Regional Education Board 1973	South	x			
Spickelmier and Freeman 1972	Texas	x			
Stallings et al. 1972	Illinois				x
Stetson 1971	Fla. Atlantic				x
Stuit 1967	U. Iowa				x
Stuit 1973	Midwest	x			
Sweet and Nuttall 1971	Boston Col.			x	
Thompson 1969	U. Nebraska				x
Tresp 1972	U. Georgia				x
University of the State of New York 1971	New York	x			
Volker 1973	U. Colorado		x	x	x
Wagner et al. 1967	U. C. Davis				x
Whitaker 1972	San Fran. State U.				x
White 1972	Calif. State System			x	x
White 1973	Calif. State System		x		
Widner and West 1968	Baylor U.				x
Wilcox 1962	Harvard				x

Note: For additional references and discussion of content validity of individual examinations, see recent editions of the *Mental Measurements Yearbook* (Buros 1959; 1965; 1972). For brief descriptions of a number of time-shortened degree programs, many of which involve exemption, see Bersi and Harp 1973.

college. This judgment must cover the level of difficulty of the test as well as the topics covered.

When deciding whether a particular examination adequately represents the curriculum, faculties at individual colleges may apply somewhat different criteria in different disciplines. A mathematics department, for example, may feel that a test to exempt freshman mathematics must cover certain very specific topics that are critical for sophomore level work. Here is an interesting ambiguity between placement versus exemption—a problem returned to in the discussion of Model 10. Or an English faculty may insist that a test for exempting freshman English must absolutely include a written essay (see White 1972 for an eloquent exposition of this position).

In any event such questions have to be taken up one at a time by individual faculties. There is no substitute for examining the individual test and deciding whether it represents appropriate subject matter—in effect, a reasonable compromise between the specific curriculum in question and other generally comparable curriculums. Content validity refers to this entire process of carefully specifying the content of a test when it is constructed and carefully evaluating whether that content represents fair coverage in a particular situation. Content validity is the most important single consideration in evaluating an exemption test, but there are several types of statistical information that tend to complement the content analysis. These can be referred to generally as empirical validity.

EMPIRICAL VALIDITY

There are various ways to analyze the scores students make on an exemption test in order to judge whether the test is measuring what one wants to measure. For example, students who have done well in a course should score better on an exemption test for that course than students who have done poorly. A common validation procedure (usually called concurrent validity) is to administer an exemption test experimentally to a class just completing the coursework in question and compute the correlation between their test scores and their course grades.

There should be a substantial relationship, but a number of factors normally keep the correlation from being too high: grades are often not reliable, they are often based partly on considerations not represented in an examination, the test content does not ordinarily match the course exactly, and so on. If the concurrent validity is lower than expected in a particular case, it is usually pertinent to ask whether the result is due to an unreliable or invalid test or perhaps due to the nature of the grades assigned. In actual practice the concurrent validity of well-constructed, broadly applicable subject examinations lies typically in the range of .40 to .60 (see College Entrance Examination Board 1973 for extensive data).

A corollary notion is that the exemption test should not correlate with course grades simply because both depend on general intelligence. The test should have discriminant validity; that is, it should be more highly related to achievement in the relevant course than to other types of achievement. There are various ways to examine discriminant validity, though it seldom receives much attention.

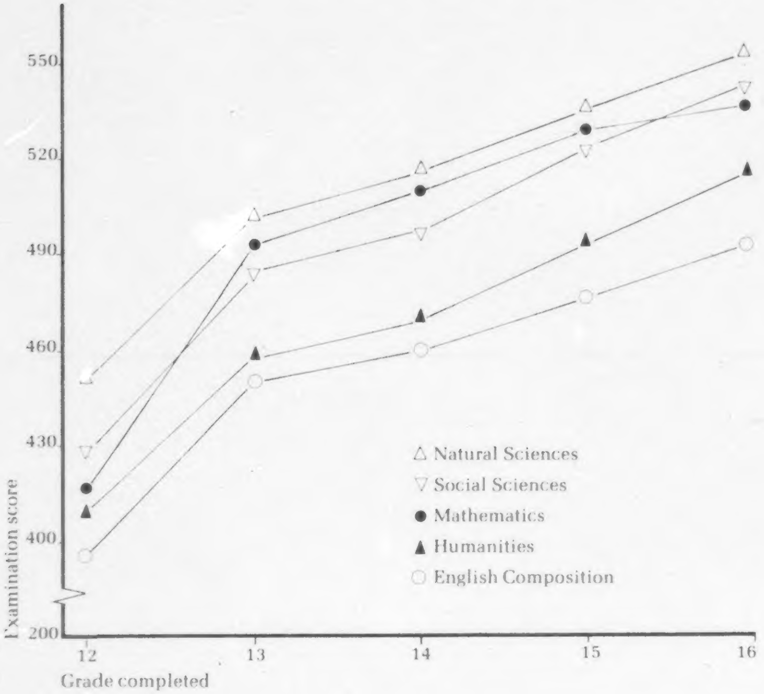
Beanblossom (1969b) questioned the discriminant validity of CLEP general examinations because they loaded on the same factors as the Washington Pre-College tests and because he judged their intercorrelations to be too high (the average r was about .50 in his sample). The former criticism is spurious, since the result described could happen with quite low intercorrelations. The latter point is pertinent but an intercorrelation of .50 allows a great deal of discrimination for highly reliable tests such as those in question.

One is bound to lose some discriminant validity in constructing tests in somewhat similar curriculum areas like humanities and social studies if the tests are fair to students from different backgrounds. As Hartnett (1972) points out, if the tests are not specific to a particular syllabus, then the alert student who has picked up a lot of general information is likely to score well on both. That is, the tests will necessarily be more highly correlated if they are appropriate for broad usage than if their content is narrowly defined. The important point is to keep specificity and generality in proper balance.

Analyzing group differences in test scores is another general approach to empirical validity—and it can help to reveal how well exemption tests discriminate. For example, if a group of students are given a comprehensive examination covering English, humanities, mathematics, natural science, and social science, those students intending to major in natural science should score highest on that part of the examination, students intending to major in social science should score highest on social science, and so on. Similarly, students who have taken many courses in a particular area should score higher on the corresponding examination than students who have taken few courses (see Haven 1964; and Krauskopf 1964 for illustrations of such relationships).

Another way to examine the validity of a comprehensive exemption test is to compare scores of different groups of individuals who have had varying amounts of exposure to education generally. Some 44,000 adults tested by the U.S. Armed Forces Institute pro-

FIGURE 16: Relationship between CLEP General Examination scores and years of education completed for 44,000 servicemen tested by U.S. Armed Forces Institute (Adapted from College Entrance Examination Board 1968)



vide a good illustration (College Entrance Examination Board 1968). As Figure 16 shows, individuals with more education scored substantially higher than those with less education on each of the major portions of the CLEP General Examinations. Similarly, colleges routinely find that sophomores score higher than freshmen. But such score gains are not necessarily due to instruction; they may simply mean that students with more education are a more select group of students. To get at the question directly, reference is made to another type of empirical validity—analysis of score gains.

Harris and Booth (1969) retested a group of sophomores at Georgia College who had taken the CLEP General Examinations as freshmen. As sophomores, the students made one-half to one standard deviation higher on the various parts of the examinations. The extent of the gain tended to vary with the students' grade average. Those who had averages of B or higher gained 55 points; those with averages from C up to B gained 50 points; and those with averages below C gained 38 points. These results do indicate that the examinations reflect real gains from instruction, but they do not rule out the practice effect of taking the tests twice.

The most extensive and methodologically sophisticated study of score gain was undertaken by Feldman and Kane (1973) at University of Illinois. After statistically controlling for ability differences and possible practice effects of pretesting, they found that students who had taken the most relevant calculus course scored 1.2 standard deviations higher on the CLEP calculus test than did students not having had the course. A similar analysis in chemistry yielded a gain of .8 standard deviation.

In both subjects students gained significantly after taking the course and the amount of gain was directly related to the grade earned in the course. The data reproduced in Table 6 provide a fairly clear case of validation through score gain, because these students had likely been subjected to little calculus instruction before the course (when the pretest was administered). As the figures in the first column indicate, students made pretty much the same precalculus CLEP score regardless of grade eventually earned, but the large score gains were made by students who did well in the course. Evidently students who made a D or E did not learn a great deal. The test confirms the teachers' judgments—and vice versa.

Score gain is an especially interesting criterion for evaluating an exemption test. Table 6 shows that gain can be clearly demonstrated under the right circumstances, but how much gain should normally be expected? If students do not gain on an exemption test after instruction, one certainly has grounds for questioning whether the test is appropriate (or whether the students have learned much). On the other hand, it would be unwise to construct exemption tests merely to maximize score gains after instruction. A test showing large gains after instruction might overemphasize factual information that is highly responsive to instruction (or short-term coaching), but perhaps relatively less important with regard to the main objectives of the course. Furthermore, a test that is highly responsive to instruction in a given college (shows large gains after a particular type of instruction) might well represent an unfair exemption test for students who have studied the material in another context. Thus score gain involves conflicting values. Exemption tests should be designed so that instruction yields higher scores, but not to the extent that other desirable and equitable characteristics of the examination are sacrificed.

TABLE 6· Precourse and postcourse scores on CLEP calculus test for students who made various grades in a calculus course (From Feldman and Kane 1973)

Grade in calculus course	Precourse test score	Postcourse test score	Points gained on CLEP calculus test
A	31.7	46.2	14.5
B	30.9	43.4	12.5
C	30.9	38.5	7.6
D	29.8	35.3	5.5
E	28.7	31.8	3.1

As a final example of empirical validation, a study by Checketts and Christensen (1974) can be cited briefly. It has elements of several of the approaches described above, but the study also has a disarming simplicity as it examines whether exemption procedures in a particular department seem to make sense. The author selected

24 students randomly from each of five groups at Utah State University: those who had been granted credit for freshman English on the basis of AP scores; those granted the same credit on the basis of CLEP General Examinations; those who took freshman English and made As and Bs; those who took freshman English and made Cs and Ds; and those who had freshman English waived on the basis of CLEP General Examinations but received no credit.

TABLE 7: Average scores on an objective English test and a written essay for five groups of students who had satisfied a freshman English requirement in different ways (From Checketts and Christensen 1974)

GROUP (Mode of satisfying English requirement)	AVERAGE SCORE FOR	
	Objective test	Written essay
AP credit	55.4	17.2
CLEP General Examinations (credit)	51.8	13.9
Passed courses (with A or B)	48.1	13.5
CLEP General Examinations (waiver)	41.6	11.2
Passed courses (with C or D)	39.9	11.3

The five groups were administered an objective CLEP Subject Examination in English and an essay test that was graded by three faculty members. The results are shown in Table 7. It is clear that those students receiving credit by examination compared quite favorably with students who had taken freshman English and done well. (English is no longer waived without credit.) Coincidentally, the data illustrate the fact that institutions have to make decisions about what score levels deserve credit. This is primarily a normative question – the second technical matter of great importance in exemption.

NORMATIVE STANDARDS

Assuming a valid exemption test, how can the cutting score above which students should be granted exemption be established? In general, it is reasonable to assume that the greatest overall benefit from exemption is likely to occur when that cut is at an equitable level in relation to locally accepted standards. What constitutes an equitable level may well vary with the nature of the situation, but it is typically necessary to refer to some normative standard as an aid in reaching such judgments.

Why a normative standard? It is true that some end-of-course examinations may be fairly specific with respect to what the student must have achieved in order to pass the course. In the following section the notion of such absolute or criterion standards is considered. But the vast majority of tests used for exemption follow the pattern of most comprehensive examinations. They include questions of varying difficulty, and scores are distributed over a wide range. If the test happens to be a local examination that has been used to assign grades, then a passing score will have been established and the normative frame of reference is readymade. But an external test poses entirely different problems of establishing standards. A properly constructed external examination will be appropriate for a variety of curriculums and will contain many questions not familiar to individual students. Thus it is inappropriate to think that some particular percent of correct answers automatically signifies passing. An equitable cutting score has to be defined in relation to the performance of an appropriate group.

There are two questions: what normative group to use, and how to set the cutting score. A normative group can be defined in several ways; it can be representative with respect to all college students (nationally) who have just completed the pertinent coursework, or to such students in a system, a particular type of college, or an individual institution. National norms have limited usefulness, but they do provide an informative framework within which colleges can better judge the performance of their students and how that performance may vary from one subject to another or one group of students to another. CLEP is the only exemption program that offers national norms, and many institutions set cutting scores in relation to those norms.

For example, as a general guide to assist institutions, the Commission on Accreditation of Service Experience recommends six hours of credit in each of the five areas of the CLEP General Examinations on which students score at or above the 25th percentile on national sophomore norms (CASE 1971). Since this standard is somewhat arbitrary considering the wide variation in academic standards throughout higher education, both CASE and CLEP encourage local norming studies and local decisions regarding equitable cutting scores. Table 8 confirms that this has happened; exemption standards on these examinations vary widely in actual practice.

TABLE 8: Distribution of cutoff scores for awarding credit based on CLEP General Examinations, fall 1972*

	NUMBER OF INSTITUTIONS REPORTING CUTOFF SCORES AT EACH SCORE LEVEL				
Scaled scores	English Composition	Humanities	Mathematics	Natural Sciences	Social Sciences
650-800	2	1	3	2	2
600-649	11	13	8	12	13
550-599	18	19	20	18	22
500-549	140	144	140	151	151
450-499	280	289	251	294	278
400-449	170	185	196	175	176
399 and below	5	3	4	4	4
Mean cutoff	476	472	469	474	474
25th percentile	428	422	413	424	423
50th percentile	494	489	487	489	488

* Data provided through Omnibus Data Collection of the College Entrance Examination Board.

While national norms do not reflect the reality of student achievement level at a particular institution, local norms can present other difficulties. For example, it may prove hard to control sampling error in local norms because of limited numbers of students available in a specific subject area. But what is more ambiguous to assess is the likelihood that local norms may be unreasonably high or low because of an unusually good or poor match between the test and the local curriculum. If the match happens to be particularly good, then local students will score well, and the norms may prove unduly difficult for an outside student seeking exemption. The opposite is likely to be true if the match is not especially good.

Because of these considerations there is much to recommend norms based on all institutions within a system of higher education. Recent norming studies in the California State University and Colleges provide an excellent illustration (Angell and Bailey 1972; White 1973). Aside from the practical and statistical arguments, it makes intuitive sense to base exemption norms on a group of similar institutions within a system rather than let the standard ride on performance in one college.

The same principle can apply to any group of institutions that share similar characteristics and educational objectives—e.g., traditionally black colleges in the South, elite liberal arts colleges, small Catholic women's colleges in the Midwest, or even "colleges of the forgotten Americans" (Alden Dunham's [1969] sobriquet for the state colleges). Most institutions have a pretty clear idea of whom they compete with, regionally and nationally. In the case of a nationally normed exemption test like CLEP, there is much attraction in developing ways to "roll your own norms"—that is, a means by which colleges could develop norms cooperatively or generate unique norms from existing data by designating colleges they feel are comparable to their own. Such tailored norms have attractive advantages, but for the present most institutions will likely continue to look to their own students for a more precise exemption standard than national norms can provide.

Assuming the institution does develop its own norms, the next question is where to set the cutting score that determines whether students are exempted or not. No doubt every institution goes at this somewhat differently. The simple, careful approach would ordinarily involve these five steps:

1. The test is administered to an appropriate group of students following instruction; local percentile norms are computed.

2. Faculty consensus is reached regarding the main considerations and basis on which a cutting score should be set—e.g., what the faculty considers to be minimum performance on this exami-

nation, how important the particular competency may be to subsequent work in the degree program.

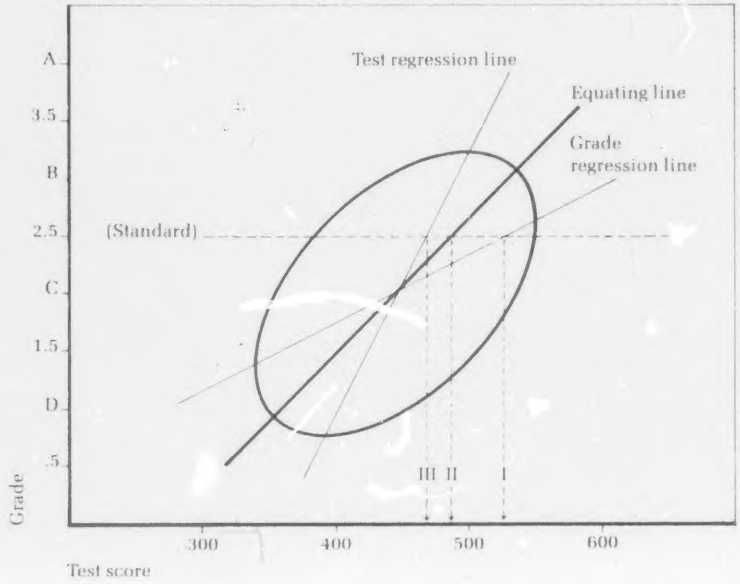
3. The side effects of applying a conservative or liberal policy are estimated – e.g., changes in teaching load at different levels, economic considerations.

4. An arbitrated decision is reached regarding what percentile level should represent the cutting score for exemption purposes – possibly with different levels designated for waiver and credit (this issue is considered later in the discussion of Model 11).

5. Results are subsequently evaluated and adjusted as necessary.

Steps may often be omitted in specific instances, but this is probably more or less the way the standards problem is approached. Though these steps seem sensible as an administrative process, the actual fixation on a particular cutting score sounds somewhat arbitrary with respect to the academic standards of the institution.

FIGURE 17: Schematic representation of a conservative standard (dashed line) and methods (I, II, and III) for defining an exemption cutting score



Most institutions make an effort to link the process directly to the grade scale. Again, there are many ways to approach this aspect of the problem (see Table 5 for references to examples). Most boil down to three basis methods (each is illustrated in Figure 17):

I. Expected grade method: Set the cutting line at that score level where the odds of making a B– are 50-50 (just to the left of this line C grades are more frequent; to the right, a greater proportion of students make Bs).

II. Equivalent score method: Set a cutting score that is equivalent to a B– in the sense that the same number of students fall below both points on the respective grade and test-score scales.

III. Average score method: Set the cutting line at the average test score for those who make a B–.

In Figure 17 each cutting score is determined by the intersection of a solid diagonal line with the dashed line that represents a (conservative) standard of B– or 2.5. The dotted lines projected on the test-score scale show the particular cutting scores associated with each method. The number of students exempted under each method is represented by the number of students to the right of the corresponding dotted line. Assuming that the joint distribution of the two variables is described by a normal bivariate surface, the hypothetical percentages of students exempted under different methods and different conditions can be determined.

Such data are shown in Table 9 for different standards and different levels of concurrent validity. It is evident that with a conservative standard method III exempts far more students than method I, but under a liberal standard the opposite is true. Or looking at it another way, with method I it makes a big difference whether the standard is liberal or conservative; with method III it makes considerably less difference. The level of concurrent validity has a smaller effect on the number exempted.

There are two main implications of this comparison of alternate methods for establishing an exemption cutting score. One is that the methods sound rather similar but their effect is quite different with respect to the number of students actually exempted. When institutions make such decisions, it is important to examine carefully the empirical outcome as well as the philosophical rationale. The second implication is that II, the "equivalent score method," is the simplest and least susceptible to misunderstanding. Furthermore, this method is the most readily linked to the five-step procedure outlined above. It simply involves a faculty decision regarding the equivalent grade level at which students should be exempted. If the judgment is that students should be exempted for test performance that is equivalent to C– or better, it is only necessary to know how many students normally receive grades of C– or better and set the cutting score at that test-score percentile of the local norm group.

CRITERION STANDARDS

A purely normative emphasis in dealing with the problem of exemption standards has inherent shortcomings, some obvious, some subtle. Local normative standards vary widely and are difficult to interpret without intimate knowledge of the norm group. Standards that emphasize relative rank naturally place half the students below average regardless of

TABLE 9: Hypothetical percentages of a sophomore norming group that would exceed an exemption test cutoff score under three methods,* three standards, and three levels of concurrent validity.

CONCURRENT VALIDITY	% EXEMPTED UNDER METHOD: I	II	III
	Conservative standard (B–)		
.30	1	25	40
.50	9	25	37
.70	17	25	33
	Median standard (C)		
.30	50	50	50
.50	50	50	50
.70	50	50	50
	Liberal standard (C–)		
.30	99	75	60
.50	91	75	63
.70	83	75	66

* Methods I, II, and III are described in the text and illustrated in Figure 17. These hypothetical figures assure that the average grade is C, 25 percent make B– or higher, and 25 percent make less than C–.

how much students learn. While there are advantages for many purposes in knowing how well an individual achieves relative to others in a broad subject area, a normative score gives limited information concerning what the student actually knows and doesn't know. This sort of score has limited value in improving the student's learning or the instructor's teaching. Furthermore, as Bloom (1973) discusses, normative standards tend to encourage a competitive rather than a cooperative student-teacher relationship. A less obvious shortcoming is that normative standards may lead the educator to avoid the critical question of what a degree actually means and whether educational programs serve a useful purpose.

Because of these shortcomings there have been several somewhat related reactions within education that tend to stress criterion rather than normative standards (see Warren 1974 for an especially useful discussion). These movements go by such names as performance testing, competency-based education, and criterion-referenced measurement. These seem partly a move away from meritocratic values and partly a move toward holding education accountable for producing visible, useful learning.

Criterion standards refer to standards that are specified in substantive, not statistical terms. The criterion here refers to a standard of performance based on external judgments of what constitutes reasonable requirements. This means especially that objectives of instruction must be specified and tests must indicate – yes or no – whether those objectives have been met. The question is what should a student know after having completed a particular course or a freshman year – what skills, what competencies, what understandings? What should such a student be able to do and how is one to know that the student can actually do it? As noted in Chapter 4, criterion-referenced measurement is especially pertinent to placement. In the case of exemption there are two tensions that must be heeded.

One concerns the specification of objectives. On the one hand, an emphasis on criterion standards is highly desirable in focusing attention on what students are expected to learn. Knowing what competencies are required helps students and faculty work toward educational goals and helps to avoid a time-serving emphasis in higher education. The problem is to specify skills and outcomes without restricting the generality of education or reducing objectives to identifiable trivia. An equally serious concern is to avoid defining objectives so clearly as to end up with a narrow and rigid curriculum.

A second source of tension concerns the pass-fail measurement of standards. On the one hand it is desirable to design a measurement system that tells students whether they have mastered required competencies rather than whether they rank at the 40th or 60th percentile. But it is important to avoid the notion that all students can or should be held to a single standard, particularly a minimum standard. In higher education in particular it is seldom obvious that a student has finally mastered a particular objective. Skills and understanding are developed to different levels of competency and sophistication.

Emphasis on criterion standards does not involve norming, per se, though one can never avoid one simple reality in defining mastery. Ultimately, any definition of mastery has to make sense in relation to what some pertinent group can reasonably be expected to attain with dedication and good instruction. In defining criterion standards in higher education, in nontraditional learning experiences, or in career requirements, there is a direct equivalent to norming. It is the difficult job of determining the appropriate performance standard or criterion level that constitutes mastery or passing. This involves gathering detailed information about what different groups can do and judgments concerning what the standard should be. Ironically this type of norming is often more complex and time-consuming than development of traditional normative standards.

The foregoing considerations pose difficult problems in applying the idea of criterion standards to exemption. The character and objectives of exemption, as discussed here, seem to make it inappropriate to define particular standards for specific knowledge and skills and require students to meet those specific standards for exemption. It would pose obvious problems of transportability and educational continuity if each institution required students to meet its own particular competencies.

A solution may lie in using criterion standards with built-in flexibility. The general approach would be to define a variety of educational objectives or competencies that can be achieved in various ways to different levels of achievement. Such an approach is mostly hypothetical, since the emphasis of criterion standards has only recently been felt in higher education. But there are a few institutions that are attempting to practice this type of exemption. Examples are discussed under Model 12.

MODEL 9: HORIZONTAL SECTIONING

As already noted, exemption involves two decisions: whether to waive a requirement and whether to put something in its stead. When a requirement is waived, one of three things can happen: (1) The student may receive credit toward a degree, in which case the effect of exemption is *acceleration*. Awarding degree credit allows faster completion of requirements, though many students take extra courses anyway. (2) If no credit is awarded, the student must take some course of his own choosing to make up the hours. In this case the effect of exemption is *elective enrichment*. Of course, it is an assumption that courses elected do offer an enriched curriculum. (3) If the student is required to take some other specific course, then the effect of exemption is *structured enrichment*—structured because the faculty designs an alternate course of value for students who are judged already competent in the course regularly required.

The first two of these are discussed in the following section. Model 9 is concerned with the last alternative. As in other types of exemption, a requirement is waived on the basis of demonstrated

MODEL 9: Horizontal Sectioning

ALTERNATE TREATMENTS		PURPOSE OF TREATMENT VARIATIONS
Ⓐ	Regular course	To enrich the program of students who demonstrate competency in a required course
○ Ⓧ	Special course required of those exempted from regular course	

competency, but the distinctive thing about horizontal sectioning is the fact that another course is substituted. This is a special form of exemption not frequently practiced, but it is fairly common in freshman English.

Most frequently this involves assigning the better prepared students to a special section – often called just that, special English, or perhaps honors or merit English. Often there is not even a different course number, but the special section is likely to incorporate quite different content than that normally stressed in a composition course (e.g., creative writing or contemporary literature). The model is based on the assumption that students know the material in the regular course and will profit more from the specially designed alternative that typically includes more advanced work or covers supplementary material. Since the model offers neither credit nor waiver of requirements, it implies a special faculty responsibility to insure that the alternate course does not really amount to time serving.

The reader may find it useful to refer again to Table 2 in order to clarify the distinctions between the three sectioning models: Models 3, 6, and 9. They have similarities, but the three strategies are fundamentally different. The term horizontal sectioning is chosen advisedly because the model does involve moving students over to an alternate course that is not required of (and perhaps not even available to) students finishing the regular composition course. Vertical sectioning (Model 3), on the other hand, waives a course on the basis of demonstrated competence in order to place the student in the second course of a connected sequence. Horizontal sectioning also bears a bit of confusing resemblance to Model 6 (selective sectioning), because the latter also involves groups that are sometimes called "honors sections." In selective sectioning, however, students are not selected because they know the material in some other course, but because it is estimated that they have the general academic ability to succeed in the especially difficult course in question.

Two recommendations concerning horizontal sectioning seem especially appropriate because there seems to be frequent confusion on both points. The first point concerns the way students are assigned to an alternate section. Often students are identified on the basis of a general purpose admissions test or some overall estimate of academic potential. For all the reasons previously cited in the discussion of ability grouping, this is a dubious practice (see Chapter 3). The more defensible procedure is to put students in a special section because they do not need to take the regular course. In this case the best measure to identify such students is an examination that represents reasonably well the content of the course waived. Just because the student is required to take an alternate course, there is no reason to assume that normal considerations concerning proper selection of a valid exemption test do not apply.

The second point concerns how one should evaluate the outcome of this type of exemption. There is a common tendency to try to apply the same achievement criterion to both honor and regular students in order to see whether well-prepared students do better in the honor than in the regular section. The fallacy of this procedure lies in the fact that the alternate section is designed to be different, so the content does not provide a common criterion for reliable evaluation. If there is overlapping content, one might argue that a test based on that content would be a fair way to compare achievement of equally able students in the two sections. But even here the comparison is invalidated because it is impossible to compare that achievement of the two groups that is represented in nonoverlapping content. The only defensible basis for comparison of alternate treatments in horizontal sectioning is some more general criterion of educational effectiveness such as faculty and student satisfaction with the sectioning arrangement of whether students are more likely to elect additional coursework in the same area. A study by Sweet and Nuttall (1971) provides a double-barrelled example of good and poor practice in evaluating horizontal sectioning.

The Sweet-Nuttall study involved grouping students into honor, standard, or basic sections of a high school English course, but the principles illustrated apply equally well at the college level. Students were grouped on the basis of several variables – intelligence, achievement, personality, and so on. Effectiveness of grouping was evaluated on the basis of two criteria: teacher grades and a specially constructed scale measuring student satisfaction with the sectioning procedure.

The study is regrettably typical in giving only superficial attention to the way students were sectioned and the way treatments varied—that is, precisely how the objectives and content of the various sections differed. It is apparent, however, that the syllabus did vary substantially across sections. Another main interest here lies in the criteria used for evaluating the sectioning.

Comparing the teacher grades is inappropriate for two reasons. It is inappropriate because the course content differed among the sections and comparison of different types of achievement proves nothing. And even if the content were identical, the comparison of teacher grades is dubious at best from a research standpoint, since there is ample data in educational literature to show that teacher grades assigned under different conditions vary for many reasons that may have little connection with actual student achievement. But the basic point is that comparing achievement on different course content is a fruitless exercise in the first place.

An interesting thing about this same study is the care that was devoted to the development of another type of criterion that is a quite appropriate basis for evaluating the sectioning. The authors constructed and refined a student attitude scale that reflected the degree of satisfaction with the section in which the student was put. There were significant differences across groups; students in the standard (middle) section had a positive attitude, while those in the other groups tended to be negative. Perhaps this result reflects an inadequate rationale connecting the method of assigning students to groups and the educational treatments offered therein. Students may have seen little point in being put in any group other than the standard section.

The actual results are unimportant. What is important is the recognition that student satisfaction is a pertinent variable in evaluating horizontal sectioning. Of course, a more useful evaluation would include faculty judgment, more detailed analysis of why students are satisfied or dissatisfied with alternate sections, and follow-up information on subsequent experience and attitudes of students of comparable ability who have taken regular versus enriched courses.

MODEL 10: COURSE EXEMPTION

This model describes the simple, uncomplicated case of exemption: granting recognition for satisfactory mastery of a specific college-level course. In discussing this model (as well as the following one) emphasis is on the examination as a means of verifying prior learning because, as previously noted, alternate methods of documenting learning are only now being explored.

As a minimum, course exemption always involves waiving a requirement. Sooner or later the student must earn an equal number of hours by taking some other course—that is, unless exemption also includes credit and speeds progress toward the degree. These alternatives—credit versus no credit—imply somewhat different educational strategies, namely acceleration versus enrichment. This model (as well as Model 11 following) includes both because the technical and administrative procedures are identical, except of course that credit is recorded in one case and not the other.

MODEL 10: Course Exemption

ALTERNATE TREATMENTS	PURPOSE OF TREATMENT VARIATIONS
Ⓐ Regular course	To recognize (through credit or waiver) knowledge acquired in a specific subject
○ No requirement or unspecified requirement	

It is surprising that there is no clear educational philosophy or accepted educational guideline that distinguishes the two ways of handling course exemption. More frequently than not, exemption does include credit, but practices vary widely among disciplines, among institutions, and among departments within the same institution. In one instance a course is waived on evidence of satisfactory achievement and corresponding credit hours awarded; in a seemingly comparable situation, the course is waived but no credit granted. Much of the inconsistency is undoubtedly due to local custom or habits within subject areas, but one principle tends to hold. To the extent that a course is taught in high school, exemption in college is less likely to include credit. Similarly, if there is heavy placement emphasis in a subject (i.e., students placed at the proper point in a sequence that started in secondary school), credit is less likely included in exemption. Perhaps the most paradoxical example is foreign language. Many students start a language in college and receive credit from the beginning, but students exempted because of prior learning often do not receive credit.

THE PLACEMENT-EXEMPTION PARADOX

An important issue lies in the ambiguous distinction between placement and exemption. The difference has never been clear in educational or psychometric literature. Throughout this review there has been an attempt to identify theoretical and practical considerations that distinguish the two. The issue is seldom addressed directly, though on occasion some writers have spoken as if the main difference lies in the fact that exemption carries credit and placement does not. This is often the case, but the present analysis suggests that from either a technical or conceptual standpoint, credit is not a critical distinction between exemption and placement. More important distinctions concern the most appropriate type of test to use, how it is best validated, and what criterion should be applied in evaluating the two strategies.

These distinctions have been discussed in some detail in the present chapter and in Chapter 4 on placement. Table 4, for example, describes a number of differences between two tests that are optimally designed for placement or exemption. Sufficient ground has been covered now, however, to reveal a placement-exemption paradox that actually occurs in Model 3. Model 3 (vertical sectioning) and Model 10 (course exemption) are the placement and exemption models that have the greatest similarity. Both involve waiving a course on the basis of demonstrated competency. The problem lies in the fact that Model 3 (vertical sectioning) actually involves both exemption and placement and this produces an inherent conflict as to whether the most appropriate test should look like the broadly equitable exemption test or the finely tuned placement test that are both described in Table 4.

The problem appears selectively. In courses characterized by what was earlier termed a homogeneous sequence – like foreign languages – the exemption type of test serves placement and exemption purposes quite well. For that matter, the so-called ideal placement test should be a real advantage only in courses where the syllabus has been highly structured into discrete topics. But in such a situation there is an irreconcilable conflict. The best placement test for instructional purposes would be a highly specific and unfair exemption test; and, as a corollary, an equitable exemption test would be, at best, a moderately effective placement test.

The paradox stems from the fact that Model 3 involves both exemption and placement, and these in turn stress some incompatible values; i.e., it is impossible to maximize effectiveness of a highly specific instructional program and also expect students with widely diverse preparation to enter that program at any point with no inconvenience or lost motion. So what kind of test should actually be used in highly structured vertical sectioning? There is probably no completely satisfactory general answer. If the particular situation seems primarily an instructional matter like those considered in Chapter 4, then a placement test is likely more appropriate. If the situation lays more stress on how much credit is awarded, then a more generally equitable exemption test may be preferable.

This flashback to placement has been necessary to help clarify the purpose and tactics of placement versus exemption. Now discussion can return to the simple case of course exemption that does not involve waiving part of an instructional sequence.

COURSE EXEMPTION PROGRAMS

Table 5 gives a number of references to surveys of institutional practices regarding course exemption. The best summary information comes from a survey of 1,185 colleges and universities that was undertaken for the Commission on Non-Traditional Study (Ruyle and Geiselman 1974). Several results are especially worth noting.

While many institutions now offer credit for off-campus experiential learning organized by their own faculty, very few institutions are yet willing to exempt students on the basis of prior experiential learning not validated by an examination. Typically, less than 1 college in 10 is willing to grant any credit for prior experiences such as teaching in the Peace Corps, extensive volunteer social work, or specialized work experience. Credit by examination is a different story. Of those colleges responding to the survey, 3 out of 4 use local examinations to grant credit. Nine out of 10 offer credit by external examination. The most commonly cited were:

Advanced Placement Program	64%
College-Level Examination Program	64
USAFI Subject Tests	38
College Board or ACT Achievement Tests	27
Cooperative Test Service (by ETS) or Cooperative Foreign Language Tests	14
Testing Programs in the Professions (Nursing, Office Management, etc.)	14
College Proficiency Examination Program (CPEP) of New York State	11

Corresponding percentages are typically larger in the case of four-year institutions and smaller for two-year institutions. Surprisingly, there are no national data available on the number of students being exempted or the amount of credit involved. Therefore, it is hard to know to what extent policies on credit by examination still exist mostly on paper. A number of institutions have always had hidden away in their catalog a statement to the effect that credit for any course could be earned by examination. But there is a great deal of difference between policy and fact. It seems reasonable to assume, however, that far larger numbers of students are now being exempted than was previously true. Though external examination programs are still modest in size, they have grown substantially in the past decade, and public interest in credit by examination has grown even more so. According to the data of Ruyle and her colleagues, as of spring 1972 about 1 institution in 4 actively publicized credit by examination, and 1 in 2 was willing to grant at least the equivalent of one term credit through exemption. It is doubtless true that sizable numbers of students take advantage of course exemption policies only if practical provisions are made to encourage and facilitate credit by examination. A limited number of institutions have developed visible and well-organized programs of course exemption. Three examples are briefly cited below; others are listed in Table 5.

University of Buffalo. The program of subject proficiency examinations at the University of Buffalo (now part of the State University of New York) has special historical interest. From its inception in 1932 the program was well publicized and based on careful research (see Barnette 1957 for a detailed account). The primary emphasis in the program was to achieve better articulation between high school and college, to provide special attention for superior students, and to encourage independent study. Even two to three decades ago large numbers of Buffalo students were taking examinations in lieu of coursework in such areas as accounting, geography, and music, in addition to more popular subjects for exemption such as foreign languages and mathematics. The Buffalo program flourished but was ahead of its time. It seemingly had limited effect on other institutions.

Michigan State University. Placement and exemption testing has been highly developed at Michigan State for 25 years. Juola (1973) described its developmental stages. The program currently places special emphasis on use of exemption examinations to validate independent study during the first two years of college. All Michigan State students are required to take four general education courses of three terms each. All 12 courses (45 hours) can be satisfied by examination. A few years ago examinations for each course were offered in two stages. Students who passed a waiver examination were exempted from the requirement. A sufficiently high score qualified the student to take an acceleration examination which, if passed, granted degree credit. Subsequently these two examinations were collapsed into one "independent study examination." Students who pass at the A or B+ level earn credit; those who pass at the C to B level have the requirement waived but do not receive credit. Michigan State provides an unusual example of a high quality local exemption program that is closely connected with the curriculum and instruction at that university.

University of Illinois. An extensive program of proficiency testing is carried out by the Office of Instructional Services at University of Illinois. Credit for practically any undergraduate course can be earned by examination, though exemption testing is much more common at the freshman level than in higher classes. The Illinois program makes heavy use of external examinations – particularly English, mathematics, and foreign languages – and routinely undertakes local norming and validity studies. Special attention has been given to the cost-benefit aspects of the program. Those connected with the program estimate that each credit hour earned by proficiency examination costs the university about $7, while the direct costs of instruction come to about $15. This cost-benefit ratio is described as conservative, since the cost includes a substantial amount of placement testing that serves students but generates no credit; and the reported benefit would represent more like $25 if indirect costs of instruction were included. (See Stallings et al., 1972.)

These three programs have much in common, but they do illustrate the rather different values and strategies that can be involved in course exemption. The Buffalo program was a trailblazer in articulation between secondary and higher education; the Michigan State program emphasizes exemption as a means of encouraging curriculum flexibility; and the Illinois program shows recognition of exemption as another way to facilitate institutional efficiency.

MODEL 11: ADVANCED STANDING

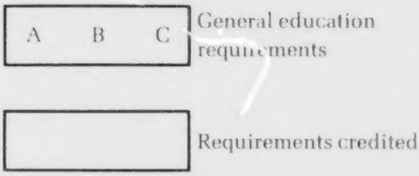
In this model the primary concern is with moving able students substantially ahead on the basis of their general educational development rather than knowledge of specific coursework. The purpose is to create more flexibility in the overall structure of the educational program; that is, to allow well-prepared students to move rapidly into advanced work or to complete a degree in a shorter period.

In recent years the Carnegie Commission and others have emphasized that the same lockstep program is difficult to justify for all students (Carnegie Commission on Higher Education 1971;

Spurr 1970). Boyer (1972), for example, gives a good accounting of recent trends in education and in society that make it important to reexamine the sacred time blocks and the common assumption that all college students should matriculate at 18 and graduate at 22. Because of increasing emphasis on adult reentry, it is misleading to think automatically that an entering student's education is restricted to formal schooling recently acquired at the secondary level. There is also good reason to believe that substantial numbers of young people could move faster at greater educational profit and less financial cost. Boyer emphasizes the fact that many present-day high school students are far more mature and more advanced academically than was true when current patterns were set. He argues further that the changing economics (great expense) of higher education and the changing relationship of education to work both speak for a shorter period of formal preparation for a career, followed by intermittent retraining.

MODEL 11: Advanced Standing

ALTERNATE TREATMENTS



PURPOSE OF TREATMENT VARIATIONS

To recognize (through credit or waiver) a given level of educational attainment

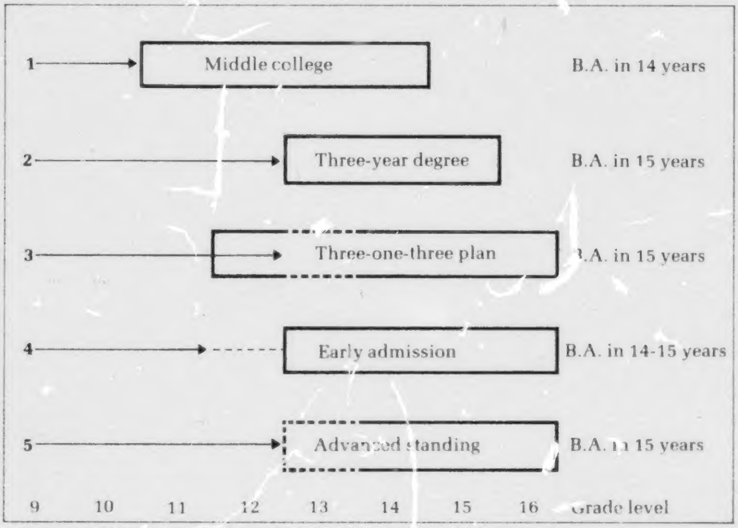
Aside from this recent special interest in shortening the time to the B.A. degree, there has long been serious concern about the overlap between the twelfth and thirteenth grades. Over the years there have been a number of plans for moving students ahead more rapidly than traditional programs provide. Advanced standing is one such plan that is based on the exemption model. To understand better the context in which it operates, it is useful to consider briefly the main alternatives for shortening the years of formal schooling required for a B.A.

LESS TIME – FIVE OPTIONS

Five alternatives cover the main possibilities for reducing the number of years from beginning high school to college graduation.[14] These are illustrated in Figure 18. The arrows show the points at which the student enters college; the labeled bars show the period covered by the degree program in each case. The first three options involve structural changes in the curriculum; the last two involve moving the student within existing structures.

1. *The Middle College.* Perhaps the best-known structural experiment in modern times was the short-lived Chicago plan. In the late 1930s Robert Hutchins introduced a new degree at the University of Chicago. It integrated grades 11 through 14 and provided an ac-

FIGURE 18: Illustration of five options for shortening the time to the B.A. degree (in each case the arrow indicates when the student enters college; the bar represents the span of the degree program; and the dotted lines indicate that the student skips a year)


1
Middle college
B.A. in 14 years
2
Three-year degree
B.A. in 15 years
3
Three-one-three plan
B.A. in 15 years
4
Early admission
B.A. in 14-15 years
5
Advanced standing
B.A. in 15 years
9
10
11
12
13
14
15
16
Grade level

---

[14] See Bersi and Harp (1973) for descriptions of a variety of specific college programs, many of which involve exemption.

celerated program for very able students (Bell 1966). The educational world was not ready for a middle college at that time. There were few imitators, though some now exist and others are proposed (e.g., La Guardia Community College, Simon's Rock College, U.S. International University; see also Hanson et al. 1970). There are sound arguments for a program that gives unity to grades 11-14 – either for technical training or as an approximate counterpart to a tough European gymnasium. Some feel that the 16-20 age period makes more sense for college training than does 18-22. But basic structural change is often a losing battle. Perhaps the main reason the middle college has had tough sledding is reluctance of educators to accept the middle college degree as a full B.A.

2. *The Three-Year Degree.* The Carnegie Commission (1971) caused a stir in recommending a shortened B.A. degree program. Students would enter college at the usual age but graduate a year earlier. Many institutions report that the three-year degree is already a feasible possibility on their campus but almost always by taking a heavier load or going to summer school (Ruyle and Geiselman 1974). Some two years after the Carnegie Commission's recommendation, the *Chronicle of Higher Education* reported that only 30 colleges actually had a three-year bachelor's program, about 20 were in the planning stage, and that interest in the three-year degree appeared to be dropping (Semas 1973). The notion has stimulated some useful discussions and literature (e.g., Southern Regional Education Board 1972), but in summarizing a conference of leading educators at Harvard, Sims (1972) reported that few participants could see the student interest, the educational rationale, or the financial justification to support the idea.

3. *Three-One-Three Plan.* Another form of structural change involves covering the college freshman curriculum in the last year of secondary school – what Boyer (1972) calls the 3-1-3 plan. It can involve little actual change beyond "accrediting" existing high school programs; e.g., for many years Georgia Institute of Technology granted sophomore standing to graduates of the A curriculum at Baltimore Polytechnic High School. In many cases neighboring secondary and higher institutions provide for joint enrollment. Despite frequent local arrangements, there has been little organized movement to transform the last year of secondary school into a generally recognized first year of college.

4. *Early Admission.* The most extensive and careful study of

early admission to college was in the early 1950s when 1,350 students entered 12 colleges some two years earlier than usual. Evaluation of the program included a matched comparison group, and the main results indicated that the academic performance of the early admission scholars was superior to that of the comparison group, the proportion of students planning graduate education was higher in the scholar group, and the scholars had a slightly higher failure rate and a somewhat higher rate of difficulty in initial personal adjustment (Fund for the Advancement of Education 1957). The results of this well-known study seemed clearly to support early admission, and some participating colleges continued the program after the study was completed. But early admission has not really caught on – possibly because of real or exaggerated adjustment problems of 16-year-olds and possibly because secondary schools are not happy to lose some of their best students. There may be a counter trend. Some signs point to renewed interest in acceleration of students especially precocious in mathematics and science (see Keating and Stanley 1972 for an interesting new project). A rather different trend is the recent report of significantly more students applying for college at the end of the junior year – because of boredom, some speculate (Babbott 1973). Many colleges are now happy to take such applicants, but they constitute less than 3 percent of entering freshmen at practically all institutions.

5. *Advanced Standing*. For purposes here, advanced standing is defined as the exemption of students from requirements (in the freshman year ordinarily) on the basis of some overall evaluation of achievement and a formula approach to granting credit. The interest lies not in assessing knowledge of specific coursework but, rather, determining whether the student has achieved sufficiently to warrant a block of credit. Typically, students are exempted in several broad areas on the basis of examinations covering those areas. For example, an exemption policy might specify that any entering student may take general examinations in social science, English, mathematics, humanities, and natural science and receive six hours of general education credit in each area in which he or she scores above local sophomore norms; that is a possible total of 30 hours.

This option for shortening the B.A. degree differs considerably from the ones previously described. The first two, for example, are structural and not differentiated according to differences among students. The third and fourth options are differentiated in the sense that only certain students might be selected, but these options apply only to young students. Advanced standing, on the other hand, is a general approach adaptable to the individual student of any age or background.

Educators have been slow to accept the validity of exempting students by examination for any substantial portion of the undergraduate experience. A limited group of prestige institutions exerted the early leadership, and there were a few influential studies that have special historical interest. One study supported by the Fund for the Advancement of Education (Blackmer et al. 1952) gave careful consideration to the problems of educational continuity in grades 11-14. It cautiously recommended an advanced placement program whereby able students could be instructed in college-level coursework in secondary school and receive college credit through special examinations. The so-called School and College Study put that possibility to successful test, and the College Board's Advanced Placement Program developed from it (see Dudley 1963; Elwell 1967; and Radcliffe and Hatch 1961 for historical accounts). During the same period, experience with the Tests of General Educational Development (GED) was convincing many that examinations could verify an individual's adequate preparation for an educational program even though he or she lacked formal schooling. As Dressel and Schmid (1951) concluded from their evaluation of the GED program, "Very clearly the program has substantiated on a large scale what many have suspected . . . that completion of the final four-year high school diploma program is not the only way to attain an educational level adequate to handle college work. . . ." CLEP was a direct descendant of the college-level version of the GED. This historical development is well illustrated by some specific examples of advanced standing programs at individual institutions.

ADVANCED STANDING PROGRAMS

A number of institutional programs of advanced standing are listed by reference in Table 5. The four described briefly below exemplify four stages in the development of this model. It might be preferable to say four alternatives, since each type is currently important in its own right.

Comprehensive Examinations at the University of Chicago. For decades many liberal arts colleges have used comprehensive examinations to verify attainment of general education objectives. But in most cases students have been required to take the prerequisite courses before writing the examination, so acceleration was not typically possible (Lewis 1961). The best-known program of general examinations specifically designed to encourage acceleration was started at the University of Chicago in 1931. Four broad examinations were offered; students could take these any time they chose (see Kreplin 1971; Bell 1966). Even though this practice was common in Europe, it was a bold move in American education. For exemption purposes, the main problem with the Chicago examinations and similar institutional programs is the fact that close adherence to a specific curriculum makes the examinations inappropriate for many students who studied in another context. As Braddock and Enger (1973) point out, it is difficult for a single institution to maintain a secure, high quality examination program that is equitable for all students.

AP at Harvard College. In 1954 Harvard initiated what it called a Sophomore Standing Program. It provided that any student who entered with advanced placement (through the College Board's AP Program) in three or more subjects would be eligible for sophomore standing. Shortly, Harvard was reported to be "enrolling a lion's share of the advanced placement candidates in the country" (Wilcox 1962). The AP candidates did constitute about half of Harvard's entering class in 1961, and 134 were eligible for sophomore standing. Now more than 100 institutions have a similar program. As compared with local examinations, the AP Program added an important dimension to advanced standing—a common standard that was transportable among institutions. It was only possible because of carefully designed courses at the secondary level and maintenance of unusually rigorous standards. To some extent this model has been recently institutionalized in the notion of the "AP

Year" – a program of three to four AP courses for seniors in secondary school. Thus, the first year of college is moved back into the final year of high school, revitalizing that year and skipping a year of college. To the extent that this sort of program becomes structured and formalized, it can be seen as a hybrid of advanced standing and the 3-1-3 option described earlier.

CLEP at the University of Utah. Another stage in the development of advanced standing occurred when many institutions began to use the CLEP General Examinations as a basis for awarding general education credit. For the first time, programs of advanced standing became fair for nontraditional students and readily available to them. One of the largest programs has been that of the University of Utah where 172,000 quarter hours of credit were awarded through this means from 1968 to 1972. McKeon (1972b) reports that a program this massive creates some changes in the "orderly" flow of students through four years – e.g., fewer students in freshman English, but compensating increases in other English courses. The Utah experience is reported to have been accompanied by much concern among the faculty, but in the end "the total patterns of enrollment and achievement apparently are not being dislocated." This seems to be true at most colleges. More than a thousand institutions now have formal exemption policies based on CLEP, and student use of the program has grown substantially. Widespread use creates another problem; sometimes there are as many CLEP credit policies within a state as there are institutions offering credit.

System-wide policy in California. Recognizing the problems of equity and transportability in exemption policy, the California State University and Colleges undertook a major study of the CLEP General Examinations (Angell and Bailey 1972). This study provided the basic validity and normative information to support a common policy regarding advanced standing for the 19 institutions in the system. It provides that any student who achieves a score of 500 or better on social science, history, natural science, or humanities in the CLEP General Examinations receives 10 units of credit for each such score, or a possible total of 30 hours at any institutions in the system. Thus another important step was taken in offering equitable recognition in comparable institutions – for traditional as well as nontraditional students.

POLICY ISSUES

How does *Model 11: Advanced Standing* differ from *Model 10: Course Exemption*? The two are clearly similar, though advanced standing involves a more radical departure from tradition and brings into focus policy issues hardly even suggested by course exemption. The rationale of course exemption is simply that students should not repeat a course they have already mastered satisfactorily, but advanced standing suggests that students who are generally well prepared can leapfrog over large curriculum areas. That latter assumption questions the validity of existing educational forms (e.g., credit hours, residence requirements, and the length of degree) and introduces complex economic questions. There are three specific issues that deserve more attention than they have received: credit equivalencies, program evaluation, and cost-benefit analysis.

As indicated in earlier discussion of cutting scores, CASE (1971; 1972) has made specific recommendations regarding what "passing scores" deserve credit, but institutional practices vary because institutional standards vary. It is perfectly reasonable that institutions should make individual decisions regarding such matters, but there has been relatively little rational analysis of (1) how much general educational credit is appropriately exempted under different conditions, (2) what considerations and circumstances argue for setting exemption cutting scores high or low for particular local groups, (3) whether exemption of general educational requirements should always include credit, or (4) whether amount of credit awarded should vary with the scores students earn on exemption tests, and if so, how much?

On all these questions, practices vary widely with no clear reason. It is not uncommon, for example, for credit to be granted at one percentile score level and requirements waived with no credit at a lower percentile level. Perhaps the unspoken rationale is connected with the fact that students who have had more courses typically score higher on an exemption test in the corresponding area. But is this consistent with the fact that credit is normally granted on a pass-fail basis – i.e., a D is worth just as much as an A though the student earning the A knows much more? Institutions have been dealing with such issues experimentally, trying out a policy and revising it the following year (e.g., see McKean 1972b; Whitaker 1972).

Part of the problem of establishing credit equivalencies is the fact that there is yet no clearly developed sense of how an institution should evaluate the educational impact of advanced standing. There seems little question regarding the general validity of the model. As Kreplin (1971) states: "Unfortunately, for purposes of political debate, almost all of the empirical data reports relatively successful programs and students. Granted that no small number of the studies have been done by individuals with some vested interest in demonstrating success, the overwhelming agreement in findings seriously calls into question a number of the major objections to credit by examination and acceleration." From a somewhat different angle, Casserly's studies of AP and CLEP students (1968; 1973) have been especially valuable in dramatizing strengths and weaknesses of advanced standing—in showing how real people become frustrated or exalted by their experiences with such programs.

But there is continuing need for holistic evaluations of the soundness of local programs from the student's and the institution's point of view. There has not been nearly enough study of the ramifications of advanced standing on individual campuses, particularly with respect to the effect on student career planning and selection of course electives, the guidance needs that are generated, and the de facto effect of advanced standing on the structure of the curriculum.[15]

Similarly, advanced standing raises complex questions of resource utilization and cost-benefit considerations. There have been a few scattered estimates of financial savings that are assumed to accrue from exemption policies—the University of Illinois figures were cited earlier. Administrators from other institutions cite savings of several hundred thousand dollars (McCluskey 1972; Tresp 1972). Most such estimates to date have been admittedly rough and in some senses superficial. Bersi and Harp (1973) present a more detailed documentation of cost savings in time-shortened programs.

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[15] Sometimes it is not fully recognized that the real curriculum is not the one in the catalog, but the sequence of courses that students actually take. A decade ago a faculty committee at Georgia Institute of Technology debated at some length whether a particular required course should be moved from winter to spring in order to balance better the number of elective hours designated for the two quarters. Curious and suspicious, the author sorted through the records of 1,200 entering freshmen seeking an answer to the question: How many students entered as regular freshmen, took 12 quarters of work, and graduated four years later in the same curriculum in which they started? The answer: 10—slightly less than 1 percent. This was in a presumably orderly school in an orderly period. The implication is that perhaps too much time is spent speculating about the curriculum without knowing enough about the actual patterns of courses individual students take.

Models for evaluating the effects of exemption on institutional financing and utilization of resources are badly needed. A useful model needs to include the overall costs and how they get distributed among the institution's sources of revenue. There are direct and indirect costs; there are rippling effects of alternate pricing and exemption policies. These considerations affect dollars as well as the way the faculty spends its time. Matters of finance and efficiency should certainly not be controlling in setting policies on advanced standing, though institutions should have a better basis for evaluating such effects. The need is for models to guide institutions in undertaking their own analysis since, in the long run, viable policies have to make educational and financial sense – and they have to be acceptable to the faculty.

MODEL 12: RECOGNIZING COMPETENCE

The three previous exemption models were all based on conventional definitions of degree requirements – courses and credit hours. An alternate method of defining a degree is to state the competencies that are required for graduation. This approach, usually called competency-based education, has important implications for exemption because it involves recognizing specific things a student is able to do rather than time spent, area requirements, etc. As a separate movement, competency-based education is quite recent, but it has a long history in basic dissatisfactions with and reactions against the credit system. Kreplin (1971) states succinctly the main shortcomings of the credit hour:

" . . . a time measure obscures what many feel ought to be the major measure of higher education – namely intellectual competence or achievement. Critics argue that requiring all students to take the same number of courses and spend the same number of hours in the classroom – the credit-hour system in a nutshell –

simply makes no sense. Students ought to be able to proceed through an educational program at their own pace. The academic lockstep arrangement measures the mechanics and formalities of the educational process rather than the product. . . . The traditional credit-hour system gives inadequate recognition to the wide diversity in experience and academic background of students, and consequently ignores differences in intellectual ability, potential, and objectives. A number of observers of the American higher educational scene have suggested that the linking of credit with time spent in the classroom severely biases the quality of the relation between faculty member and student. The faculty member is put in the position of policing students to ensure that the required amount of time is indeed spent, and the student is given insufficient responsibility for his own educational progress. Finally, it is argued that the credit-hour system stands in the way of educational experimentation at the overall individual institutional level."

A decade earlier Lewis (1961) had cited much the same sorts of problems and described three modes of deviation from the course-credit mold: independent study, credit by examination, and comprehensive examinations. These and similar mechanisms have added flexibility, but they operate basically within the same course-credit structure. Competency-based learning challenges that structure. It is described by the Fund for the Improvement of Postsecondary Education (1973) as follows.

Competency-based learning is an effort (1) to specify educational goals explicitly as competencies learners are expected to acquire, (2) to develop procedures for assessing individuals and awarding

MODEL 12: Recognizing Competence

ALTERNATE TREATMENTS		PURPOSE OF TREATMENT VARIATIONS
Ⓐ Ⓑ	Required competencies	To check off competencies previously acquired
○ ○	Competencies credited	

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credentials for mastery of those competencies, and (3) to develop educational experiences that contribute directly to the attainment of those competencies. Assessment of individuals for mastery of competencies differs from traditional educational assessment in three ways:

(1) Assessment focuses on the results of learning. Demonstrated competence can be recognized independent of time spent, courses taken, or type of exposure to educational activity. Competencies can be recognized that were attained outside a formal educational process or before enrollment.

(2) Since the focus is on attainment of competencies, individuals need not be judged in relation to how others perform. The important consideration is whether the individual can meet a given standard of performance.

(3) Competency-based learning places relatively more emphasis on performance than conceptualization. In conventional learning the ability "to know" is the primary concern; in competency-based learning the ability "to do" assumes more importance (Fund for the Improvement of Postsecondary Education 1973).

Earlier a distinction was drawn between normative standards and criterion standards. It is clear that the competency movement seeks to place much greater emphasis on the latter. There is also a connection with mastery learning and criterion-referenced testing that were discussed in relation to individualized instruction in Chapter 4. In important respects competency-based learning is a direct extension of individualized instruction. In the former many of the same principles and procedures are applied to a curriculum as are applied to an individual course in individualized instruction. An example helps to clarify how this actually works.

THE ALVERNO CURRICULUM

A number of mostly small colleges are attempting to develop competency-based curriculums. At this writing, one of the more advanced is that of Alverno, a Catholic women's college in Milwaukee. In developing their "competence-based" curriculum.[16] Alverno places special stress on the idea of liberal education as a means of learning to manage one's life. The curriculum includes eight competences that are essential if a woman is "to function as the kind of developing, productive human being, both personally and professionally, who is true to her beliefs. This level of functioning involves the ability to make decisions, to develop initiative, and to acquire confidence and responsibility for implementing those abilities – i.e., the ability to manage one's life" (Alverno 1974). The eight competences are: (1) develop effective communication skill, (2) sharpen analytic capabilities, (3) develop workable problem-solving skill, (4) develop facility in making independent judgments and independent decisions, (5) develop facility for social interaction, (6) achieve understanding of the relationship of the individual and the environment, (7) develop awareness and understanding of the world in which the individual lives, (8) develop knowledge, understanding, and responsiveness to the arts and humanities.

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[16] The term most frequently used is "competency-based" education. Because Alverno uses instead "competence-based," the latter term is employed here for discussion of the Alverno curriculum.

There are six distinct levels for each of these competences. The first level of each competence typically involves identification of important elements. The sixth level might require comprehensive understanding from various disciplinary standpoints and a demonstration of competency through a quite substantial integrative piece of work. Students are given guidelines, extensive resources, and advising, but it is ultimately their responsibility to learn how to develop and manage their own education so that the competences they graduate with will be useful in relation to their personal and career goals.

Graduation requirements at Alverno specify that the student must have attained the fourth level in each of the eight competences (32 competence-level units), eight additional such units, including mastery at the sixth level in at least one competence. Mastery of individual competences is assessed according to various specified standards and procedures. When each student enters Alverno, she has the opportunity through the assessment process to receive immediate credit for her level of achievement in any competence. "She begins with Level 1 of each and subsequently proceeds to whatever level she can. Inherent in this process is the possibility of demonstrating college attainment without time spent on campus – advanced placement, in effect." (Alverno 1974)

As would be expected, assessing competence in this type of curriculum involves a host of substantive and technical problems. The content of the educational program is basically problem-centered rather than oriented toward the academic disciplines. Assessment must go beyond knowledge of subject fields to the ability to integrate and come up with acceptable solutions to problems. Such assessment often means appraising complex performance rather than asking questions that have one right answer. Defining standards of competence is especially difficult. The first impulse is to define what graduates must be able to do, but any such external or philosophical definition is conditioned by what students can do with reasonable effort and good instruction; that is, it is difficult to escape completely a normative influence in setting any standard.

Another critical problem is how specifically or generally the competences are defined. If competences are defined too broadly, bright students may be able to check off degree requirements quickly without putting out much effort. If they are defined too narrowly, the curriculum becomes more a highly specific training program than broadly useful education.

Given these difficult problems, the Alverno program and others like it represent a significant curriculum reform. The emphasis on educational results tends to move the curriculum toward individual development and the intellectual demands of adult life rather than the special interests of academic disciplines. It clarifies the connection between education and personal goals.

From the standpoint of this review, competency-based education is also important because it clearly differentiates the credentialing and educational functions. In a traditional program it is perhaps too easy to emphasize the value of residency and require time for credentials regardless of actual knowledge. In the competency-based approach, it is inherently natural to check off those competencies already attained. Furthermore, the performance emphasis in competency-based education makes it more likely that a person with prior experience will have already attained some competencies required for a degree. Thus, this type of curriculum dramatizes the importance of exemption in articulating higher education with other forms of learning.

With a competency-based curriculum it is also easier to see that a wide variety of competencies gained in work situations should be almost synonymous with some requirements of degree programs, especially career-related degree programs. If that were not true, many degree programs would be of doubtful practical utility. A sound basis for recognizing occupational competence that is related to academic requirements would greatly facilitate and encourage the movement of adults into career-related academic work. Though some exploratory work is under way (Educational Testing Service et al. 1973), exemption for competency gained on the job is probably the most demanding form of articulation and the least well developed.

Two potentially serious impediments to competency-based education are suggested by Dressel and Thompson's (1973) analysis of independent study. One is the fact that students seem to have great difficulty in working on their own and taking responsibility for their education. Another is the observation that curriculum changes that do not fit into the usual departmental structure are not likely to succeed. If these generalizations are at all accurate, the implication would be that competency-based education is more likely to flourish in community colleges and small four-year colleges that emphasize student development and are less often dominated by discipline-oriented faculties.

7

Conclusions and Implications

This report began with the assertion that it is increasingly necessary for higher education to adapt to large individual differences among students. This is a conclusion widely shared. In recent years a large number of educators at many institutions have taken quite seriously the problem of better meeting the educational needs of individual students. Some focus on the technology of individualized instruction; some individualize the entire degree and the conditions under which it is obtained; many others range between these extremes.

This report is narrowly concerned with one general means of adapting education to individual differences: to group students into alternate educational treatments according to cognitive differences in academic ability or knowledge of subject matter. There are many ways that colleges put different students into alternate treatments, and many names are applied to these practices though they are not used consistently or with any common understanding of educational purpose or technique.

With notions from decision theory serving as a basic framework, this report identifies four broad classes of alternate treatments—assignment, placement, selection, and exemption—and 12 common models that fit within those four classes. These classes and these 12 models provide a useful framework for thinking about the ways one can design alternate treatments and how the various methods are related, one to the other. The models have been examined in the preceding four chapters. This report includes a fairly careful review of literature concerning research and current practices, including examples wherever possible. From a theoretical standpoint, the report attempts to identify the basic parameters and principles on which these models operate. From a pragmatic point of view, the report sought to describe the best ideas from various sources as to how the models work and how they ought to work.

This review has included a great deal of discussion concerning specific technical points, common misconceptions, tactics likely to be most effective in particular situations, and so on. A principal purpose has been to collect and organize such detailed information, and the previous chapters are directed to that end. There is no need, nor indeed is it possible, to summarize such impressions. Thus, the primary intention and value of this review lie in the previous pages. But in this final chapter it is useful to look broadly at what is to be learned from it all. What general conclusions can be reached regarding the status and validity of these models? What implications are to be drawn concerning major trends, important problems that need attention, or ways that educational practices can be improved?

In focusing on conclusions and implications that have some general applicability, it is useful to bear in mind some compelling forces in higher education today. Exactly what issues have the highest priority at a particular time is debatable, of course, but for purposes here it is useful to view this discussion of alternate treatment models in light of these considerations:

1. Expansion of educational opportunity has been a dominant theme in higher education for at least a decade. The right of minorities, women, and adults to have easier access to postsecondary programs – and the fact of their being there in greater representation – has become so well accepted as to effect gradual change in public expectations regarding the very purpose and function of colleges and universities.

2. Partly because of this expanded clientele (often accompanied by a declining student body) diversification of higher institutions and programs has become critically necessary and has, in fact, proceeded at a bristling pace in the early seventies. Flexibility, options, relevance, and innovation – these are by now hackneyed expres-

sions. Nonetheless, they have become almost articles of faith, both with respect to the substance and the procedures of many academic programs.

3. The broadening of the clientele, the relaxation of standard practices, the seemingly rapid moves into unfamiliar types of learning—all raise a haunting concern over quality. Aside from some expected inertia from more conservative faculty, there are legitimate fears that precipitous adjustments to new circumstances may inadvertently compromise important strengths in higher education.

4. Greatly complicating these concerns, and often overshadowing them, is the economic problem most institutions expect to live with for the indefinite future. Often there is simply the unavoidable necessity to save money, while simultaneously attempting to broaden opportunity, diversify programs, and maintain traditional quality. The resulting tensions seem likely to ripple through higher education for some time to come.

This is the context in which college programs must now be viewed, but the vicissitudes of educational priorities are well known. In most cases the basic function and character of these models transcends a limited time period and the particular issues associated with it. Throughout this review there has been an attempt to discuss these alternate treatment models with concern for contemporary issues as well as the more lasting technical character of the model and its underlying logic. It is in that spirit that the following conclusions and implications, many of which are interrelated, are considered.

Conclusion. *Higher education is now faced with articulation problems that rival those of the 1890s.* Around the turn of the century there were acute problems because of the fact that secondary schools could not prepare students for diverse admissions requirements in different colleges. At the time the problem was serious, but compared to the present situation it can almost be characterized as a dispute over Virgil versus Cicero as the proper poet to master in the final year of secondary school. In Chapter 6 the complexity of the current problem is discussed in some detail. Articulation between secondary and higher institutions now ranges from extensive remedial problems to mass programs of advanced standing. Problems of transfer among institutions draw increasing attention across the country. And higher education faces a truly formidable articulation problem in attempting to establish useful correspondence and continuity between learning that occurs within formal education and nontraditional situations.

All these problems are concerned with the comparability and transportability of learning from one context to another. They quickly raise questions concerning the role of *higher education, the* objectives of degree programs, and the relationship a college maintains with other types of institutions – colleges, schools, industries, and so on. The overall articulation problem is intensified by the continuing efforts of foundations, government agencies, and educators to diversify educational programs and opportunities, to create options for students, to foster alternate ways of getting an education. All these movements blur the distinction between formal higher education and other learning situations. These developments serve many socially worthwhile purposes, particularly in making it easier for students to gain access to useful education experiences. The problem lies in the fact that such developments make it correspondingly difficult to maintain educational continuity, to give students credit for what they know, and to insure equity.

Implications. It is no longer appropriate to think of matriculating students moving into a "regular" program. Most students now come to college with a variety of learning experiences – some that may be immediately creditable toward a degree, and some that may represent deficiencies. A matriculating student's achievement and competencies need to be systematically assessed and matched against degree requirements. Once one accepts the notion that no automatic assumptions can be made about what entering students know or don't know, then assessment and recognition of prior learning experiences becomes a fundamental part of the educational program.

It has only recently become obvious in the case of transfer admissions that more systematic guidelines are required within states and systems to handle transfer articulation. Similarly, accrediting agencies and coordinating groups need to devote far more attention to (1) guidelines regarding acceptable practices in developing programmatic relationships between secondary and higher institutions, and (2) proper means of incorporating nontraditional learning into degree programs.

Locally, institutions need to be sure that someone is responsible for developing and reviewing reasonable articulation policies and practices. Maintaining educational continuity for students with quite diverse backgrounds and plans requires a systematic assessment program, comprehensive credit policies, and means for giving students the advice they need for educational planning. These functions are often fragmented throughout a campus, and they have the reputation of not being handled well. Educational functions that concern a particular department need to involve that department, but these problems seem badly in need of coordination and leadership on most campuses.

Conclusion. *The most critical and controversial issue in the adaptation of higher education to individual differences is the tension between meritocracy and egalitarian values.* This tension is especially evident when the expansion of educational opportunity through open admissions is felt to be incompatible with the maintenance of academic standards. It is not just a matter of whether students with poor academic records should be admitted to the state university. The same questions arise with respect to what students should be allowed to enter demanding programs or courses.

In an egalitarian interpretation of educational priorities, any student should be able to pursue any educational aspiration. "Maintaining standards" should not be used as a dodge for excluding students from quality education, especially when apparent limitations in academic potential are due largely to a long history of social and educational disadvantage. In the meritocratic view of education, open access for any student to any educational experience is neither efficient nor effective for the more able or for the less able student. It serves no useful purpose to fill a class with students who cannot cope with the material. One of two things can happen, and both are undesirable. The content and standards can be lowered to meet the capabilities of all students, or the instructor can lecture over the heads of most students and watch them fail in due course.

Both the egalitarian and the meritocratic points of view are valid. The dilemma is how to guard against artificial restrictions that limit student development and hamper individual sense of freedom without creating punitive learning experiences or a deterioration of standards. From a practical standpoint the differences between meritocratic and egalitarian values seem insurmountable. As most college curriculums are set up, the differences may be insurmountable to a considerable extent. This is because standards are maintained in difficult academic programs *not* by defining standards, but by limiting access to very able students, exposing them to appropriate courses, and requiring conscientious work. Most students so selected are able to keep up, and they turn out reasonably competent in relation to the general expectations of the program. This is one accepted strategy for relating individual differences to alternate educational treatments. A principal drawback is the limited provision for admitting individuals who could succeed with extra effort, motivation, and time.

But difficult programs do not have to be set up in ways that make meritocratic and egalitarian values incompatible. If the general principles of placement are applied to an entire degree program, then in theory any student should be able to enter any program and progress as fast as accumulated learning allows. The emphasis then shifts from sorting students on the basis of learning potential to determining what the student now knows and what must be mastered next in the sequence of competencies leading to the degree.

Implications. Using the placement strategy in dealing with the meritocratic/egalitarian problem has these main implications. It is necessary to put much closer attention to the structure of the curriculum, the specific competencies that are required, and the objective standards to which students will be held. At the micro level, this orientation to education is typified by individualized instruction, discussed in Chapter 4. At the macro level, this strategy is well represented by the Alverno curriculum described in Chapter 6. In either case the crucial element is to describe in objective terms what the student must know or be able to do at each phase of learning in order to move on to the next phase.

In current practice prerequisite courses come closest to this approach, though ironically prerequisites are now much in disfavor. But notice that the prerequisite course is not really the same idea. Rather than defining competencies that have be be acquired, the prerequisite is often perceived by students as a procedural barrier. A competency-based curriculum serves the same purposes for which prerequisites are designed. But such a curriculum also expresses a degree program as ladders of accomplishment to which any student has access at any level he or she can handle. Some students may require more time or assistance in moving from one level to another, but this fact should have no detrimental effect on standards of academic quality that characterize each level. An important added advantage is that outcomes of education can be stated as explicit accomplishments rather than time served or competition among students.

Conclusion. *Placement and exemption are by far the more important of the four classes of alternate treatments discussed in this review.* This is due in large part to the fact that problems associated with articulation and open admission are especially concerned with putting students into educational treatments according to their level of achievement in particular subject areas.

Implications. With increasing emphasis on crediting students for demonstrable competencies, examinations and other means of assessing student achievement will play a more critical role in higher education. As assessment becomes a more important means of marking progress and verifying accomplishments (rather than credit hours), it becomes far more important to understand fully the relationship between assessment and instruction. Without competitive grading to rely upon, faculties must be doubly concerned with the equity of standards, what examination results communicate to students, and how assessment for placement should differ from assessment for exemption.

Until recently, the use of tests for placement and exemption has been limited in scope and often restricted to individual departments. A more general use of examinations for such purposes places a greater burden on measurement practitioners to follow procedures that are equitable and foster learning in desirable ways. There is special need for those in research and development to devote more attention to exemplary models of placement and exemption. Testing specialists and agencies should devote a larger share of their time and resources to the criterion aspects of tests and their interpretation. Tests of educational achievement should yield more direct information concerning the student's specific competencies, how those competencies are related to his or her educational objectives, and what constitutes acceptable standards of performance.

Conclusion. *It is important to recognize placement as an instructional strategy – a strategy concerned primarily with improving the effectiveness of learning in a particular sequence of related courses.* Placement is ordinarily conceived as a problem of educational measurement, though it is probably safe to say that the most demanding aspect of effective academic placement is syllabus design rather than assessment technique. The placement problem dramatizes the intimate relationship between instruction and evaluation of student progress.

Implications. The principal implications of this general conclusion are that a placement test should reflect the nature of the course sequence, the way it is taught, and the content. If a course sequence is highly structured with specific topics, so should be the test. In the case of a less structured sequence taught with a more holistic approach, or a course that has similar content running through the sequence, a more conventional test yielding an overall measure of competency might be more appropriate.

In either event, placement has a clear objective of improving instruction and is clearly evaluated on the basis of how much students with comparable competency achieve when placed at alternate points in the course sequence. Such evaluations are rare, but they could provide an important means of improving instruction generally, because such evaluations would focus attention on which students are actually learning what. Furthermore, careful examination of placement in a course can do much to clarify problems that are normally regarded as exclusively concerned with curriculum or syllabus. For example, development of the most effective placement in a course sequence requires answers to such questions as these: What are students expected to know or be able to do at the end of the course? What is the structure of the subject? Can it be divided into modules? Is there a natural sequence? Clearly, answers to such questions are not only helpful in selecting the most appropriate placement test; they also get to the heart of the instructional problem and the rationale for the course. Of course, some instructors might say that the outcomes of their courses are not so readily specifiable or measurable. In that case effective placement is questionable – but then so may be the course.

Conclusion. *Placement is an exceedingly common procedure, though often carried out incorrectly; though readily evaluated, it is very rarely evaluated in actual practice.* Certain conventional strategies are typically used in placement. Students are placed on the basis of some general measure, often chosen because it correlates with course grades, not because it corresponds to the content of the course. By the same token students are placed in sections where the content does not well match their deficiencies in the subject. Consequently, placement is inefficient at best and may often be hardly worth the effort. This fact is seldom revealed because remarkably little effort is exerted to discover whether practices are effective or not.

Implications. There are complicated and simple ways of placing students; the same is true of evaluating the outcome. If placement is to be improved as an educational technique, it is quite necessary that more well-designed research technique be undertaken. This review provides a theoretical framework and some deductions regarding what should be preferred procedures. So little systematic research has been done, however, that these suggestions must be put in the category of reasonable but untested assumptions. In short, there are placement practices but no technology; there is some theory but little verification.

But in the meanwhile many more institutions should follow the lead of such universities as Syracuse, Michigan, Illinois, and Texas at Austin, which have central offices to facilitate improved placement practices. These offices provide consultation to departments, undertake special studies, and create placement models that serve local circumstances. In addition there are scores if not hundreds of institutions engaged in some form of placement testing. It is the rationalization and improvement of that work that is badly needed. The educational programs of exceptionally large numbers of students each year are involved.

Conclusion. *Exemption is an institutional strategy that goes far beyond the question of whether students have already mastered certain prescribed subject matter.* Most faculties have been quite willing to grant credit to a student who can pass the final examination in a course, but this fairly conservative position does not engage the critical issues. The real question is how an institution defines a degree and in what ways it is willing to recognize generally comparable accomplishments that have been achieved in some other learning context. Exemption policies and practices are a primary means of articulating an institution's programs with those of other colleges, schools, business, nontraditional forms of learning, and so on. Thus exemption is an important way in which an institution defines its relationship to the larger learning society.

Implications. In addition to giving students credit for what they know, exemption serves the broader purpose of making learning transportable. In order to do so, examinations or other means of appraisal have to be fair for students coming from a variety of learning situations. An examination that only reflects the local curriculum does not serve this purpose well. Furthermore, institutions have to face the difficult question of when exemption should be granted for learning experiences or accomplishments that are not "the same as" but are nonetheless "just as good as" its own degree requirements.

Standards in granting exemption should be determined by expectations that are applied to local students or, better yet, students at comparable colleges. The flexibility of institutions in granting exemption varies widely with respect to the type of learning that is acceptable, the level of competency demanded, and the amount of credit that can be thus earned. There are no fixed guidelines regarding such practices; perhaps there never will be because exemption policies are formulated as a result of many considerations—effect on the faculty, educational merit, attractiveness to potential students, economic factors, effect on the institution's reputation and image, likely changes in the mix of students enrolled, and so on. Implementing exemption policies that might affect any substantial number of students has as much to do with the sociology and the economics and the politics of an institution as it does educational philosophy and practice. These issues are much in need of study.

Conclusion. *Credit equivalencies are a major problem in granting exemption, though this problem has received little attention beyond local ad hoc decisions.* There is considerable variation among institutions in the amount of credit that can be granted for general educational requirements. Without clear rationale, exemption may or may not involve credit at a particular institution, and the amount of credit may vary according to score earned on an exemption test. Even more difficult problems loom with respect to experiential learning. Decisions regarding amount of credit granted for particular experiences or accomplishments are usually made by individual faculty members or departments, often on the basis of how much time was involved. There is widespread concern that such decisions vary considerably and are not always well founded.

Implications. Wide variation in the practices of individual colleges and the lack of any accepted guidelines are very likely to lead to a general mistrust in exemption as an accepted practice among reputable institutions. It seems particularly important to head off any such erosion in confidence. Credit equivalency involves substantive as well as attitudinal issues that need to be carefully studied and discussed in a national context. Such a project should be a high priority for an accrediting association or some similarly appropriate agency.

Conclusion. *Widespread interest in experiential learning and other forms of nontraditional education pose serious problems in assessing valid educational accomplishments achieved off the college campus.* In large part, this interest represents a reform movement to make higher education more relevant to adult life and the actual demands of work situations. It is widely assumed that higher education in the future must become more service oriented toward the adult learner, yet there is at present little basis for assessing what an adult in midcareer already knows and how that knowledge should be related to what he or she might learn in a formal educational program. Verification of experiential learning for exemption purposes is especially troublesome because it often involves unfamiliar assessment techniques and unfamiliar conditions of learning that are frequently not under direct faculty observation.

Implications. There are many partly subjective ways of appraising achievement and documenting accomplishment that are long familiar on college campuses (e.g., ratings of laboratory work, evaluations of engineering drawings, judgment of the quality of a report). Such methods will have to be formulated in ways that will permit reliable assessment of off-campus learning. This means the development of public guidelines and exemplary standards that can serve to communicate accepted practices among institutions. There is an inevitable tension between flexibility and credibility in this assessment. Rigid procedures would defeat the point of experiential learning; a lack of standards will undermine confidence in the academic quality of such programs.

If indeed higher education does become more oriented toward retraining and toward intellectual and leisure interests of adults, the most obvious problem will be curriculum redesign. A second problem will be to establish an effective correspondence between formal study undertaken in postsecondary institutions and adult accomplishments and academically related occupational skills. Some such experimental work is already under way, though it has a long way to go before a truly effective relationship can be developed between education and work. The desirable end result is not in equating work and education, but rather establishing better points of contact and common currency so that the one more effectively feeds the other.

Conclusion. *Special programs for particular groups of students have drawn criticism and can probably expect more.* Honors programs received strong support a decade ago but are now sometimes charged with elitism or questioned as an unjustified "extra expense." Despite continuing questions regarding their effectiveness, comprehensive compensatory programs are still on the upswing. It would not be surprising to see such programs move into a decline, if for no other reason than the fact that programmatic movements in education tend to lose their momentum in a few years if their success is not clearly demonstrated.

Implications. It is ironic that special arrangements like honors and compensatory programs often have essentially the same rationale as do special institutions, but the latter ordinarily do not have to meet the same criteria of success as do the former. Nonetheless, in a period of fiscal stringency, all special programs had best prepare their defense. One especially pertinent line of defense is to do everything possible to become cost effective. In prudent bureaucratic practice, this means avoiding anything that can be interpreted as a "frill," and also persuading the authorities that the unit costs of the special program are actually no greater than those of a regular program. A second line of defense is to undertake more convincing evaluations to demonstrate that special programs do serve a useful purpose—that something will be lost if the programs are not funded. It seems intuitively evident that honors and compensatory programs serve a vital role on many campuses, but there is often no hard evidence to support that conclusion. The great need is for imaginative demonstration of the tangible benefit of special treatment for special students.

Conclusion. *Despite considerable research interest in the assignment class of alternate treatments (Models 1 and 2), there is little evidence of important relationships between instructional variations and conventional scholastic ability.* Future research will doubtless qualify this assertion, but for all practical purposes it seems that more able students achieve consistently better than less able students, regardless of the instructional methods used.

Implications. After many years of interest in the topic, it is probably time to give up the idea that there is some simple way of treating bright and dull students differently and have them learn equally rapidly. Some relatively new types of psychological dimensions like cognitive styles show considerable promise for identifying different types of individuals whose learning efficiency might vary markedly under different conditions of instruction. But in general, research in this area is not at the stage of deriving results that are immediately useful in educational practice. It is worth noting, however, that research on these problems is far more sophisticated than it was just a few years ago. For that reason significant breakthroughs are more likely than might otherwise be expected.

Conclusion. *The increasing options and flexibility open to students place additional strain on an already inadequate system of educational advising.* Practically any important instance of alternate educational treatment generates guidance problems because there are always some students who need assistance in understanding the choices they have to make. Several of these alternate treatment models involve substantial problems of educational guidance, many of which are met very poorly if at all. For example, placement often works most effectively if students are consulted and placement is treated as educational guidance. Honors and compensatory programs are heavily dependent on personal advising. Any substantial amount of exemption is likely to involve complicated problems of educational planning, both in identifying what prior learning can be credited toward an educational goal and in making the best use of the time and credits that exemption provides. In short, more effort to adapt education to individual differences creates more special situations that require advice on an individual basis.

Implications. Student advising is not a strength of the faculty in most institutions. And it seems very unlikely in a time of budgetary restraint that professional counselors can handle the added problems that seem to be generated by the articulation problem in particular. In searching for new alternatives for faculty advising, two general possibilities seem promising. Both were once considered heretical. One is to develop self-instructional materials for college students and adults, materials that can lead the individual through the various possible actions that need to be considered in a particular educational/career planning situation. Such materials have been used with considerable success in secondary schools. A second attractive possibility is the training of peer counselors to help students cope with routine problems in educational/career planning. In several pilot programs (e.g., Exxon 1973; Southern Regional Education Board 1972b) students have proven quite effective in helping fellow students.

Conclusion. *Though educational practices are increasingly rationalized in financial terms, exceptionally little attention has been devoted to the cost-benefit character of alternate treatment models.* There has been considerable interest in possible cost savings in credit by examination, but public analyses have been mostly superficial.

Implications. It is reasonable to assume that budget specialists encourage some educational programs or methods and inhibit others, sometimes on the basis of simplistic cost accounting that never sees the light of day. It is important that educators give more attention to the economic considerations that bear heavily on educational decisions. Administrators should make a special effort to involve faculty and students in the development of cost-benefit models of alternate educational treatments and programs. This is likely the only way to ensure that sound educational values and the learner's needs are properly represented against short-range expediency and short-sighted economics.

Annotated Bibliography

PREPARED BY JANE PORTER
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Ablon, L. J. A modular approach to preparatory mathematics. *American Mathematical Monthly*, December 1972, vol. 79, pp. 1126-1131.

This article is a good, clear illustration of a hierarchical placement model in which the emphasis is on modular construction of instructional units, and tests are designed to assess mastery of individual units. The author describes a mathematics program at Staten Island Community College that is designed to enable underprepared students to move as quickly as possible into the regular precalculus course. The program consists of four 10-lesson modules that cover only those areas of arithmetic and high school mathematics necessary to understand topics in precalculus. The tenth lesson of each module is an evaluation, after which the student either remains in the same module or moves on to the next one. All modules are offered during the same blocks of time, so that students are free to move ahead when ready without a scheduling problem. An optional fifth module serves as an introduction to precalculus. All incoming students take a five-part placement test. The first four parts correspond to the four program modules, and the student is placed in the first module in which he shows substantial weakness. The fifth part is used for placement in calculus or precalculus.

Ahmann, J. Stanley, and Glock, Marvin D. An evaluation of the effectiveness of a freshman mathematics course. *Journal of Educational Psychology*, 1959, vol. 50, no. 1, pp. 41-45.

This article describes a careful evaluation of a remedial course in applied mathematics. The course was specially designed to include topics necessary for success in later science courses. Entering freshmen in the College of Agriculture at Cornell University were assigned as follows. Those with superior mathematics ability (top 20 percent) were excluded from the study. The remaining students were divided into an experimental group who took the one-semester course in applied mathematics and a control group who received no math instruction. The Cornell Mathematics Test, which covered the same topics as the experimental course, was used as a pretest and posttest.

Results showed that: (1) students in the experimental group had significantly better score gains on the posttest, (2) the subsequent achievement of the two groups in later courses did not differ significantly, and (3) the cumulative attrition rate for the two groups was almost the same. In the opinion of both students and faculty, however, the course was a success. This is an especially interesting study because it was carefully executed but found no beneficial effect of the mathematics course on performance in later science courses. It may be that control students worked harder on nonmathematical aspects of science courses and thereby compensated for deficiencies. This possibility could be checked by separately grading questions on science examinations that do and do not have mathematical content.

Aleamoni, Lawrence M. A study of foreign language learning at the University of Illinois. *Measurement and Evaluation in Guidance*, 1973, vol. 5, no. 4, pp. 468-474.

The University of Illinois conducted a study to validate the College Board foreign-language Placement Tests for local use. Scores on the reading and listening tests and end-of-course grades were recorded for all students enrolled in four sequential courses in each of four languages – French, German, Russian, and Spanish. There were significant differences among the mean scores at the four levels for each language. The median correlation between reading score and course grade was about .60; the correlations between listening scores and grades were significantly lower. In most cases the mean test score was found to represent the point above which few students made grades of D or E. Thus a cutoff was established so that an incoming freshman who scores below the test-score mean for a particular course is placed in that course. Proficiency credit is granted on the basis of test scores and number of years of high school study.

This use of a single score (i.e., average of reading and listening scores) for determining placement is fairly conventional, and it illustrates the simpler approach to test construction and validation that is possible in a homogeneous course sequence like foreign language, as opposed to a modular course sequence that is more characteristic of science and mathematics.

Alverno College. *Competence based learning at Alverno College.* Milwaukee, Wis.: Alverno College, 1974, 13 pp.

This booklet describes an unusually good example of an educational program that restructures the entire curriculum in terms of competencies students must demonstrate in order to earn a degree. Such emphasis dramatizes exemption and other assessment problems, because it raises pointedly the question of whether students have already mastered some degree requirements at the time they enter college. See Chapter 6 of this report.

Angell, Melvin A., and Bailey, Roger L. *A report of the 1972 California State University and Colleges systemwide research project on the College Level Examination Program General Examinations in humanities, natural sciences and social science–history.* Los Angeles: Office of the Chancellor, California State University and Colleges, 1972, 94 pp.

The purpose of this study was to gather a representative sampling of the performance of typical students from the entire California state university-college system on the general examinations of the College-Level Examination Program (CLEP). Over 1,300 sophomores (58 percent of a randomly selected sample) completed a background questionnaire and took one of three CLEP tests – humanities, natural sciences, or social science–history. From the results, the investigators computed a wide range of statistical data. The report represents an important effort to develop a normative frame of reference for exemption policy that incorporates the stability and fairness of a large sample of students from a number of similar institutions.

Berliner, David C., and Cahen, Leonard S. Trait-treatment interaction and learning, in Fred N. Kerlinger (Ed.), *Review of research in education, 1.* Itasca, Ill.: Peacock, 1973, pp. 58-94.

The authors provide an excellent review of the research on trait-treatment interactions (TTIs) relevant to Model 1 (method variation) of assignment, discussed in Chapter 3 of this report. They discuss the background of TTI research as well as methodological and conceptual problems. TTI is described as an approach to research rather than a clearly defined substantive research area; thus the review is not exhaustive. The studies are grouped according to treatment and trait considered. On the one hand, the authors conclude that "significant interactions are not a rare occurrence and some interactions have important implications for the design of instructional treatments," but on the other hand many hypotheses about interactions were not confirmed, many findings of interaction were contrary to the hypotheses being tested, and in the few cases in which interaction studies have been replicated, interactions have not been substantiated. They see as a necessary next step "the examination and integration of theory for the purpose of generating hypotheses involving interactions."

Bersi, Robert M., and Harp, Mary Ann. *Restructuring the baccalaureate: A focus on time-shortened degree programs in the United States.* Washington, D.C.: American Association of State Colleges and Universities, 1973, 160 pp.

The authors present examples of various approaches to time-shortened degree programs including (1) curriculum reform and revision of degree requirements, (2) cooperation between high schools and colleges, (3) award of advanced standing with credit, and (4) individualized degree programs. There is a chapter on cost savings and a directory of 243 colleges and universities reporting time-shortening activities on their campuses. The heart of the book is a compendium of detailed, nonevaluative descriptions of 73 proposed and operational time-shortened degree programs. Included in these descriptions is such information as admissions requirements, advising, assessment, and special features.

Blackmer, Alan R. (Chairman), et al. *General education in school and college: A committee report by members of the faculties of Andover, Exeter, Lawrenceville, Harvard, Princeton, and Yale.* Cambridge, Mass.: Harvard University Press, 1952, 142 pp.

In the early 1950s, representatives of three private high schools and three colleges met to discuss the relation between the last two years of secondary school and the first two of college. With the support of the Fund for the Advancement of Education, they studied curriculum and articulation problems and concluded that grades 11 through 14 should be treated as a continuous unit. They suggested new curricular arrangements and advanced placement examinations that would allow an able student to complete in seven years the traditional eight years of high school and college. This classic study argued the case that students can be advanced on the basis of what they know and that set unit requirements are not a necessity.

Block, James H. (Ed.) *Mastery learning: Theory and practice.* New York: Holt, Rinehart and Winston, 1971, 152 pp.

Six articles by leading spokesmen in the field make up this useful overview of mastery learning. The editor provides an introduction and a chapter on operating procedures for mastery learning. Benjamin Bloom discusses affective consequences of school achievement and strategies for mastery learning. John B. Carroll's contribution is an extension of his well-known article "A Model for School Learning" (also annotated here). Peter W. Airasian discusses the role of evaluation. A summary of research and a detailed bibliography conclude the book.

Bloom, Benjamin S. Recent developments in mastery learning. *Educational Psychologist*, 1973, vol. 10, no. 2, pp. 53-57.

Bloom was largely responsible for developing the notion of mastery learning, and this article is a good statement of some recent research on the subject. Two somewhat unexpected findings were (1) the extent to which students in mastery learning situations develop cooperation in their learning as opposed to competition, and (2) the increased interest and positive attitudes toward the subject matter produced by the increased competence the student develops. According to the author, research also demonstrates the probability that "students become more efficient in their learning under mastery learning conditions and that students become more and more alike in their learning efficiency as measured by time devoted directly to the learning effort."

Bloom, Benjamin S., Hastings, J. Thomas, and Madaus, George F. *Handbook on formative and summative evaluation of student learning*. New York: McGraw-Hill, 1971, 923 pp.

This comprehensive handbook, designed for classroom teachers and teachers in training, describes problems and techniques in the measurement of learning outcomes. Part I deals with evaluation problems common to all subject fields and includes sections on educational objectives and mastery learning, types and uses of evaluation, evaluation systems, and varying measurement techniques for different cognitive and affective processes organized around Bloom et al's. *Taxonomy of Educational Objectives* (1956; 1964).

Part II consists of 11 chapters on evaluation of learning in various subject fields and educational levels ranging from preschool language development to secondary school mathematics and industrial education. Each of these chapters contains a detailed table of contents and a master table of specifications showing content and behaviors identified as relevant to the subject area. The book is especially useful to curriculum specialists, test constructors, and program evaluators.

Boyer, Ernest L. How much time for education? *Educational Record*. 1972, vol. 53, no. 4, pp. 271-280.

Boyer gives a historical account of attempts to break the traditional, arbitrary four-year time blocks for high school and undergraduate education. Although most such attempts in the past have ultimately failed, he feels that present conditions warrant reconsideration of educational timing. He recommends that provisions for continuing education – during, after, and between work – be increased, and that a national commission study the timing of the entire educational sequence with the aim of condensing the time span for prework education.

Briggs, Leslie J. *Sequencing of instruction in relation to hierarchies* *of competence*. Pittsburgh, Pa.: American Institutes for Research, 1968, 132 pp.

A basic reference in the field of instructional theory and design, this monograph is the most thorough and scholarly work available on the notion of sequencing. The author reviews the research literature in a detailed and systematic manner and makes recommendations for further research and curriculum design.

Broome, Edwin Cornelius. *A historical and critical discussion of college admission requirements*. New York: Columbia University, 1903. (Reprinted by College Entrance Examination Board, New York, 1963, 157 pp.)

In 1963 the College Board reprinted this first-hand description of the classic articulation problem that came to a head in the late nineteenth century. At that time high schools had widely varying curriculums and standards, and colleges had widely differing standards for admitting students. Part I is a detailed history of American college admissions requirements beginning with the Colonial Period, and Part II describes the situation at the turn of the century. The author considers articulation from the point of view of the high school as well as the college. He suggests three means of securing closer articulation: flexibility in a high school curriculum and college admissions requirements, accreditation of high schools, and uniformity in admissions requirements.

Buros, Oscar Krisen (Ed.) *The seventh mental measurements yearbook*. Highland Park, N.J.: Gryphon Press, 1972, 2 vols., 1,986 pp.

The Mental Measurements Yearbook, now in its seventh edition, is the primary source of information on standardized tests. It consists of objective, professional, comprehensive test reviews organized by subject and written by recognized specialists representing various viewpoints. In addition to the nearly 800 reviews written specifically for the *Yearbook*, it includes almost 200 excerpts from test reviews originally published in journals. Where appropriate, each entry includes a list of references on the construction, use, and validity of the specific test reviewed.

Carnegie Commission on Higher Education. *Less time, more options: Education beyond the high school*. New York: McGraw-Hill, 1971, 45 pp.

Outlined here are the Carnegie Commission's recommendations regarding the general flow of students into and through the formal structure of higher education in the United States with emphasis on the key role played by degrees. These well-known recommendations call for basic structural changes that would encourage the breakdown of the rigid lockstep educational pattern and the time-serving characteristic of traditional degree programs. Modifications are proposed to (1) shorten the length of time in formal education, (2) provide more options in and in lieu of college, and (3) make educational opportunities more available to individuals throughout their lifetimes. Appendixes describe efforts already under way in the directions recommended by the report. One of the most influential of the Carnegie Commission reports, *Less Time, More Options* has likely contributed to the increasing overlap of high school and college and the resultant problems of articulation.

Carnegie Commission on Higher Education. *Continuity and discontinuity: Higher education and the schools.* New York: McGraw-Hill, 1973, 116 pp.

According to the Carnegie Commission, this country has recently entered a new phase in the history of high school-college relations—a phase in which limited finances, the need to provide equal opportunity for all students, and the growth of nontraditional study and more flexible curriculums at all levels have made closer ties and increased cooperation a necessity. Articulation is particularly lacking in the areas of college admissions, curricular planning, and guidance and career counseling. The report emphasizes the need for new structural patterns for progressing through the educational system and expanded mechanisms (through educational institutions, governments, testing agencies, and foundations) for maintaining school-college relations. This is required reading for anyone seriously concerned with the broader issues involved in college placement and exemption.

Carnegie Commission on Higher Education. *Toward a learning society: Alternative channels to life, work, and service.* New York: McGraw-Hill, 1973b, 112 pp.

This is the first of the Carnegie Commission reports to look at postsecondary education in its entirety—that is, to include educational programs and institutions other than colleges and universities. The commission stresses here that more and better pathways to work, service, and adult life are needed for all youth—those who do not attend college as well as those who do; that educational opportunities of various sorts should be available to people of all ages; and that the walls between work, education, and leisure, as well as those between age groups, should be torn down.

Carroll, John B. A model of school learning. *Teachers College Record*, 1963, vol. 64, no. 8, pp. 723-733.

In this seminal article, Carroll presents a conceptual model of factors affecting success in school learning and how they interact. According to the model, "the learner will succeed in learning a given task to the extent that he spends the amount of time that he *needs* to learn the task." The time needed is determined by aptitude for the particular task (defined as learning rate), ability to understand instruction, and the quality of instruction.

Determinants of time spent in learning are time allowed for learning (opportunity) and perseverance (time the learner is willing to spend). Three of these five elements – aptitude, ability to understand instruction, and perseverance – are traits of the individual. The other two – time allowed for learning and the quality of instruction – depend on external circumstances. These external factors as well as perseverance can be modified to enhance learning.

This model applies to all learning tasks, no matter how broad or narrow, although it does not apply to attitudinal or emotional conditioning. The author suggests it is necessarily oversimplified in the assumption that all school learning can be broken down into a series of discrete tasks, but he finds the assumption useful nevertheless. Others certainly agree; Carroll's analysis has had considerable impact on educators' thinking regarding the basic determinants of whether students learn.

Casserly, Patricia L. What college students say about Advanced Placement. Parts I and II. *College Board Review*, Fall 1968, no. 69, pp. 6-10, 28-34; Winter 1968-69, no. 70, pp. 18-22.

Interviews with over 400 students at 20 colleges were the basis for this interesting article on student attitudes toward the College Board's Advanced Placement Program. Anecdotes and quotations make it an unusually readable research report. Part I covers placement of high school students in AP courses; student evaluation of these courses, their teachers, and their counselors; college provisions for AP students; and changes in student assessment of AP after four years of college. Part II covers student feelings about how participating in the AP Program affected their later academic and career decisions and how the program could be improved. This report plus another concerning the College-Level Examination Program (Casserly 1973) are unique in providing an illuminating view of articulation problems from the vantage point of those real people most intimately involved.

Casserly, Patricia L. *College-Level Examination Program: Its meaning to participants.* College Entrance Examination Board Research and Development Reports, RDR-72-73, No. 6. Princeton, N.J.: Educational Testing Service, 1973, 62 pp.

Examinees who took the CLEP General Examinations were surveyed to determine their reactions to the tests and to the concept of credit by examination. The questionnaire provided such information as (1) how CLEP takers find out about CLEP; (2) why they take the tests; (3) how they feel about credit by examination, about the difficulty and relevance of the tests they took, and about the need for CLEP tests in other subject areas; (4) effects of taking the exams (e.g., receiving college credit, qualifying for a job, changes in self-image, changes in educational and vocational plans); and (5) problems nontraditional students encounter in continuing their education. There are interesting verbatim comments in an appendix and sprinkled throughout the report. The author's main conclusions were that CLEP can best serve user needs by better communicating what the Program can and cannot do and by specifically redefining its target population as the truly "nontraditional" students.

Cohen, Joseph W. (Ed.) *The superior student in American higher education*. New York: McGraw-Hill, 1966, 299 pp.

The Inter-University Committee on the Superior Student existed from 1957 to 1965 under the direction of Joseph W. Cohen. This volume, the most comprehensive work available on honors programs, was its final project. The purpose of the committee was to extend the idea of honors programs throughout higher education. The 11 chapters of the book cover such topics as history of the honors movement, characteristics of the superior student, characteristics of an honors program, departmental honors, honors at various types of institutions, and program evaluation.

Commission on Non-Traditional Study. *Diversity by design*. San Francisco: Jossey-Bass, 1973, 178 pp.

The Commission on Non-Traditional Study was formed in 1971 to examine the current status of nontraditional education, assess needs, and recommend directions for the future. It was sponsored by the College Entrance Examination Board and Educational Testing Service and funded by the Carnegie Foundation. This book, which constitutes the commission's final report, brings clearly into focus the potential of and need for nontraditional education. It clarifies the problem of articulation between external education and traditional institutions and identifies the need for accepted means of granting credit, both for cognitive knowledge in traditional academic subjects and for other forms of creditable learning of an experiential nature.

In attempting to define nontraditional study, the commission agreed that it is "more an attitude than a system and thus can never be defined except tangentially. This attitude puts the student first and the institution second, concentrates more on the former's need than the latter's convenience, encourages diversity of individual opportunity rather than uniform prescription, and deemphasizes time, space, and even course requirements in favor of competence and, where applicable, performance."

Cronbach, Lee J. The two disciplines of scientific psychology. *American Psychologist*, 1957, vol. 12, no. 11, pp. 671-684.

This presidential address to the American Psychological Association is a classic discussion of the two branches of psychological inquiry – experimental and correlational – covering differences between the two, their historical development, their potential contributions to each other, and the need for combining them into a new and integrated discipline. The distinctive characteristic of modern experimentation is the statistical comparison of treatments, whereas correlational psychology assumes a fixed treatment and studies variance among aptitudes or traits. The difference exists in applied as well as academic psychology.

Cronbach feels that the greatest social benefit will come from applied psychology when the best treatment is found for each individual. This necessitates the joint application of experimental and correlational methods. It is not sufficient for each discipline to borrow from the other; a united discipline will study both variance among treatments and variance among traits, but in addition it will be concerned with the otherwise neglected interactions between trait and treatment variables.

Cronbach, Lee J., and Gleser, Goldine C. *Psychological tests and personnel decisions.* (2nd ed.) Urbana, Ill.: University of Illinois Press, 1965, 347 pp.

This is the definitive and comprehensive treatment of the decision-theoretic approach to placement, selection, and related personnel decisions. The book is abstract and mathematical rather than practical or readily interpretable in terms of routine placement problems. Originally published in 1957, this later edition includes more recent papers and commentary. Topics of special relevance to placement include the nature of decision theory, trait-treatment interaction as the basic strategy in placement, the bandwidth-fidelity dilemma, and criteria for evaluating outcomes. The basic rationale presented here serves as a theoretical foundation for placement, but it has had almost no direct bearing on practice because of the wide gap between the assumptions involved and actual classroom practices.

Cronbach, Lee J., and Snow, Richard E. *Final report: Individual differences in learning ability as a function of instructional variables.* Stanford, Calif.: School of Education, Stanford University, 1969, 211 pp.

Although unpublished, this report is an especially important contribution to the literature on instructional research and particularly on aptitude-treatment interactions. The authors reviewed the literature concerning studies that fit the ATI patterns and found that the methodology commonly used in such research was weak. They reanalyzed data from some of the reports and conducted two experiments to test hypotheses about ATI. The report includes some incisive discussions on research methods and such topics as the concept of learning rate, prediction of learning-to-learn, and general observations on ATI and educational policy. This is not a report for the technically weak-kneed. Its strength lies in its theoretical and conceptual development, despite the fact that the report seems to lack a head and a tail. Evidently that is related to the authors' foreword complaint that the project sponsors insisted on a premature product to make a deadline.

Nonetheless, the product has much to offer and has proved quite influential. An extension of this report is in preparation.

Cross, K. Patricia, Valley, John R., and Associates. *Planning nontraditional programs: An analysis of the issues for postsecondary education.* San Francisco: Jossey-Bass, 1974, 263 pp.

Staff members of Educational Testing Service and the Center for Research and Development in Higher Education at Berkeley prepared this book for the Commission on Non-Traditional Study. In one chapter Mahler presents a review of the literature on postsecondary nontraditional study with a bibliography of 263 selected items. Carp, Peterson, and Roelfs report the results of a survey of 3,900 adult Americans concerning their learning interests and experiences. Over three quarters of the respondents expressed an interest in engaging in some form of learning. Of the "learners" (all respondents who reported having received some instruction in the past year), a majority received no academic credit for their learning; 18 percent received some kind of formal credit; 7 percent earned college degree credit.

A chapter by Walton explores the ways nontraditional study can be offered to adults. He stresses use of educational technology and the need to provide instruction where students are and when they want it. Important chapters by Warren on credit and measurement, Hefferlin on bogus degrees, and Ruyle and Geiselman on nontraditional opportunities in traditional institutions are annotated separately here.

Diamond, Robert M., Eickmann, Paul, Kelly, Edward, Holloway, Robert, Taylor, Eleanor, and Wilson, Timothy R. *Syracuse University's Center for Instructional Development: Its role, organization and procedures.* Syracuse, N.Y.: Syracuse University, 1973, 29 pp.

This report describes in detail a good example of a centralized university office concerned with improving instructional quality, especially through systems of individualized instruction. The procedures of the Center for Instructional Development involve placement and exemption. Its services include development, support services, research, and evaluation of instructional projects throughout the university. The development efforts are carried out in conjunction with the individual academic departments with input from students, faculty, administration, and community.

Dressel, Paul L., and Thompson, Mary M. *Independent study: A new interpretation of concepts, practices, and problems.* San Francisco: Jossey-Bass, 1973, 162 pp.

Dressel and Thompson reviewed the literature on independent study, conducted a survey of current practices, and interviewed students, faculty, and administrators. They found that independent study as a concept receives much praise, but that it is not widely endorsed in practice. Independent study, they believe, can best be viewed not as a relatively expensive learning experience, but rather as a capability to be developed and as a major goal of education. Although they make explicit recommendations for improvement, the picture they paint of current shortcomings and problems is generally bleak. Since independent study is an important component of honors programs, directors of such programs could benefit from taking the findings of this book into account. The same applies to many nontraditional programs.

Duane, James E. (Ed.) *Individualized instruction – programs and materials: Selected readings and bibliography*. Englewood Cliffs, N.J.: Educational Technology Publications, 1973, 366 pp.

One of the most recent contributions to the field, this book is a compilation of articles on practical aspects of individualized instruction. It is directed to an audience of those responsible for implementing individualization programs in the schools. The contributors represent practitioners and researchers and include such leaders in the field as John C. Flanagan (Project PLAN) and John O. Bolvin (Individually Prescribed Instruction).

The readings are divided into sections on (1) the transition from group to individualized instruction, (2) established individualized instruction formats, (3) media, and (4) evaluation. Each section begins with an introduction stating the themes of the articles and concludes with a comprehensive bibliography covering the last four years. The book also includes annotated bibliographies of textbooks and media and four sample individualized instruction packages.

Dubin, Robert, and Hedley, R. Alan. *The medium may be related to the message: College instruction by TV*. Eugene, Ore.: Center for the Advanced Study of Educational Administration, University of Oregon, 1969, 114 pp.

Dubin, Robert, and Taveggia, Thomas C. *The teaching-learning paradox: A comparative analysis of college teaching methods*. Eugene, Ore.: Center for the Advanced Study of Educational Administration, University of Oregon, 1968, 78 pp.

These two monographs review the research on the relative merit of various teaching procedures. They differentiate between media and methods: An instructional medium is "a total configuration of the technology and interaction between teaching and learning" – educational TV and face-to-face instruction. A teaching method is "a recognizable procedure employing a given medium of instruction," for example lecture and discussion.

The authors of *The Medium May Be Related to the Message* examined instructional media, especially educational television. They analyzed the data from 42 studies in which teaching method was held constant and achievement was reported in group mean scores on identical examinations. Results showed that students performed markedly better with face-to-face instruction than with two-way TV, and there was no significant difference in the performance of students taught by one-way TV and those taught by other instructional media. Further findings demonstrated little resistance to educational TV on the part of students but considerable resistance from professors.

In *The Teaching-Learning Paradox* the authors describe their review of the data from 91 comparative studies on teaching methods. When student performance on final examinations was used as a criterion, they found no one teaching method to be superior. They stress the need for new research approaches and for a model of the teaching-learning process at the adult level.

Neither monograph considered the outcomes of matching students with instructional methods or media. For a more recent and well integrated review of the effectiveness of various instructional methods, see Jamison, Suppes, and Wells (1974).

Dunn, James E. A study of the University of Arkansas mathematics entrance exam as a placement device. *Journal of Experimental Education*, 1966, vol. 34, no. 3, pp. 62-68.

Freshmen entering the University of Arkansas are placed in one of five mathematics courses according to their scores on a placement test consisting mainly of questions on basic algebra. This article reports an evaluation of the effectiveness of that test, but the significance of the study lies in the procedure developed to decide whether students had been placed correctly or incorrectly.

Toward the end of the second semester, students completed a questionnaire that asked (1) what course they had initially been placed in, (2) whether they had found the course too advanced, not advanced enough, not interesting, or just right, and (3) what course they felt they should have been placed in. Some dissatisfaction was indicated by 125 students out of 137.

On the basis of the questionnaire responses and performance in the courses, "ideal" groups were established for each course. Using the placement test with its current cutoff scores, individual probabilities of misclassification into the ideal groups were as high as .70. Neither changing the cutoff scores nor blocking the test into several batteries of questions reduced the probabilities of misclassification by much. The author recommends construction of a new test based on the specific content of the alternative courses.

Educational Testing Service. *College Entrance Examination Board College Placement Tests: Score use and interpretation manual.* Princeton, N.J.: ETS, 1972, 22 pp.

Designed for colleges using the College Board College Placement Tests, this manual presents a nontechnical, step-by-step explanation of how a Placement Test should be chosen, validated, and used. It illustrates how test results can be used for exempting students from a course, placement in the appropriate level, sectioning within a course, or placement in a remedial course. The suggested procedures involve frequency distribution and simple statistics.

Educational Testing Service and a Group of Colleges and Universities. *Announcing the cooperative assessment of experiential learning.* Princeton, N.J.: ETS, 1974, 9 pp.

An important exemption problem in nontraditional education is how to assess experiential learning for academic credit. The Cooperative Assessment of Experiential Learning (CAEL) project is a joint effort of ETS and nine institutions heavily involved with the problem. The purpose is to develop methods and materials, other than conventional tests, for assessing experiential learning. The developmental work will focus on three objectives: (1) to inventory current practices and to develop a taxonomy of assessment needs, (2) to develop a comprehensive collection of appropriate assessment materials and methods, and (3) to develop ancillary manuals and guidelines for effective use of the methods and materials created. The project, which has been funded by the Carnegie Corporation, also provides for tryout and validation of the materials and for utilization of project outcomes through forum activities, publications, and training activities.

Findley, Warren G., and Bryan, Miriam M. *Ability grouping: 1970. Status, impact, and alternatives.* Athens, Ga.: Center for Educational Improvement, University of Georgia, 1971, 94 pp.

In 1969 a task force was formed to study ability grouping in public schools across the nation. The significance of its final report lies in the generally negative evidence of the merit of grouping according to general ability without systematic variation in method or content. The task force found that evidence of the effect of ability grouping on scholastic achievement in the high-ability classes was at best conflicting and nonconclusive; at the same time they found "ample evidence" that such grouping has negative effects on the learning of pupils in low-ability and average groups. Furthermore, the authors conclude that grouping enhances favorable self-concepts of learners in the high-ability tracks but reinforces negative self-concepts of those in the low tracks. The low-ability pupils are deprived of the stimulation of the brighter children and suffer a stigma (in their own eyes and in the eyes of their teachers) worse than that associated with poor performance in a heterogeneous class.

Flanagan, John C. The PLAN system for individualizing education. *NCME Measurement in Education*, 1971, vol. 2, no. 2, 8 pp.

In this article, Project PLAN – Program for Learning in Accordance with

Needs – is described by the man most responsible for its development. The PLAN system is a comprehensive systems approach to individualized education, which integrates guidance and decision-making with instruction and makes extensive use of educational technology. Its basic components are: *(1) a set of educational objectives*, *(2)* learning methods and materials, (3) evaluation, (4) guidance and individual planning, (5) teacher development, and (6) computer services to monitor and integrate the system.

Fund for the Advancement of Education. *They went to college early.* Evaluation Report No. 2. New York: FAE, 1957, 117 pp.

In the early 1950s the Fund for the Advancement of Education became concerned with the lack of articulation between the various segments of education and the failure of the American education system to accommodate individual differences. As one attack on these problems, it financed an experimental Program for Early Admission to College and compared 1,350 students admitted to college before they finished high school with a control group matched on the basis of academic aptitude.

Academically the early admission students performed better than the control group, and a higher proportion planned graduate study. They had more problems in adjusting to campus life than the older control group students, but most of these difficulties were judged to be minor and were soon overcome. The report concludes that ". . . under the proper circumstances early admission to college represents a promising approach to the problem of freeing the able student from the 'lock step' and helping him to realize his full potential."

Gagné, Robert M. (Ed.) *Learning and individual differences.* Columbus, Ohio: Merrill, 1967, 265 pp.

The chapters of this book comprise the papers and discussants' comments presented at a 1965 conference on the question of how people may be expected to differ in their learning, and how these ways might be measured as individual differences. In the first paper Glaser discusses the historical development of research on individual differences in learning. Particularly relevant to this report is Chapter 2, which contains Cronbach's paper describing alternative patterns of instruction in the schools and their varying implications for individual differences and Carroll's discussion of these ideas with respect to matching teaching methods and individual differences. In other chapters the topic of individual differences is discussed with reference to verbal learning, attention, problem solving, and motor learning. Melton's paper concludes the book with a discussion of individual differences and theoretical process variables and an interpretation of some of the major issues and implications of the other presentations.

Gagné, Robert M. *The conditions of learning.* (2nd ed.) New York: Holt, Rinehart and Winston, 1970, 407 pp.

Four main ideas are presented in this book: (1) Eight types of learning can be identified by the conditions associated with them. (2) These types of learning can be arranged hierarchically so that each type is prerequisite to the next. (3) For any given learning task a hierarchy of subordinate tasks, in which each task must be mastered in order to facilitate the learning of the next, can likewise be identified. (4) Instruction should be designed with such hierarchies in mind. Gagné defines the eight learning types as signal learning, stimulus-response learning, chaining, verbal association, discrimination learning, concept learning, rule learning, and problem solving. The book was written for students of psychology and education who already have some knowledge of learning research and theory.

Glaser, Robert. Instructional technology and the measurement of learning outcomes: Some questions. *American Psychologist*, 1963, vol. 18, no. 8, pp. 519-521.

At the 1963 annual meeting of the American Educational Research Association, Glaser discussed the measurement of subject-matter proficiency and introduced the notion of criterion-referenced tests. An achievement test score can provide two types of information – the degree to which a student has reached a certain level of performance (criterion-referenced) and the relative ordering of individuals with respect to their achievement (norm-referenced).

In evaluating instructional systems, achievement tests can be used for two purposes – to provide information about an individual's present behavior and to provide information about the instructional treatments that produce that behavior. The difference in constructing tests for these uses lies in the selection of test items. In each case the sample of items is drawn from a population of items indicating the content of performance, but the items most suitable for measuring individual differences are those that will differentiate among individuals all exposed to the same treatment, while those most suitable for distinguishing between groups are those most likely to show whether students have achieved instructional objectives.

Glaser, Robert, and Nitko, Anthony J. Measurement in learning and instruction, in Robert L. Thorndike (Ed.), *Educational measurement*. (2nd ed.) Washington, D.C.: American Council on Education, 1971, pp. 625-670.

This chapter is an excellent and detailed reference on the relation of measurement to instructional theory. After a comprehensive introduction, the authors describe a general instructional model for adapting instruction to individual differences and its implications for testing and evaluation. Topics treated include analysis and definition of performance domains, hierarchical structures, mastery learning, individual assignments to instructional alternatives, and the use of criterion-referenced tests to diagnose and place students and to monitor and assess achievement. The last section covers evaluation and improvement of an instructional system and its components. Perhaps better than any other single source, this chapter expresses the instructional point of view in the development and use of educational tests.

Goldberg, Miriam L., Passow, A. Harry, and Justman, Joseph. *The effects of ability grouping.* New York: Teachers College Press, 1966, 254 pp.

The authors undertook an exhaustive study designed to assess the effects of ability grouping on the academic, social, and personal attainment of fifth- and sixth-grade children. The sample consisted of about 2,200 pupils in 86 classes in 45 schools. The results did not support the common belief in negative effects of grouping on self-concept, aspirations, interests, or attitudes toward school. The major finding was that narrowing the ability range in the classroom on the basis of some measure of general academic aptitude has no important effect on academic achievement. The authors conclude that real differences in academic growth depend on the content of the curriculum and the method of teaching. Whether grouping is good or bad depends on how it is used.

Gougher, Ronald L. Individualization of foreign language learning: What is being done, in Dale L. Lange (Ed.), *Britannica review of foreign language education.* Vol. 3. Chicago: Encyclopaedia Britannica, 1971, pp. 221-245.

In reviewing the literature of 1970-71 on individualizing foreign-language instruction, Gougher covers such issues as rationale for individualization, behavioral objectives, use of media, language laboratories, teacher education, and implementation in the schools. The literature and conferences of that year document a growing interest in both the theory and the practice of individualized instruction. Ten areas of individualized language instruction are discussed: multimedia programs, programmed learning, small group work, mini-courses, individually prescribed instruction, self-pacing and performance objectives, independent study, interest and relevance, computer-assisted instruction, and differentiated staffing. The author regards programmed learning and independent study as insufficient for foreign-language learning because they do not develop speaking skills, but he considers small group work especially desirable. In describing some exemplary programs he stresses the implementation problems of cost and time for developing curriculums. He found that most operating, full-scale programs were heavily funded and/or run by unusually dedicated teachers.

Gould, Samuel B., and Cross, K. Patricia (Eds.) *Explorations in nontraditional study.* San Francisco: Jossey-Bass, 1972, 137 pp.

A collection of background papers for the Commission on Non-Traditional Study, this book was a cooperative effort of commission members and staff. In the Prologue, Gould defines nontraditional study as "a group of changing educational patterns caused by the changing needs and opportunities of society." These patterns involve the concepts of individualized learning; full educational opportunity; flexibility in structure, method, content, and procedures; and new or expanded educational roles being assumed by business, industry, labor unions, the military, etc. Hartnett's overview of nontraditional study includes discussion of the need for nontraditional programs, the kinds of students who could benefit from them, types of activities that would "loosen up" the traditional system, and difficulties and issues in nontraditional study. Cross and Jones explore problems of access to higher education and the need for new options in instruction, counseling, and the recognition of educational achievement. Kimmel's chapter on problems of recognition is annotated separately in more detail. In the concluding chapter, Valley describes six models of external degree programs: administrative-facilitation, modes-of-learning, examination, validation, credits, and complex systems models.

Hanson, Emil Otto. *An investigation of the validity of the College Level Examination Program's General Examinations and a review of related issues in higher education.* Ph.D. Dissertation, Department of Educational Administration, University of Utah, 1973.

This unusually detailed dissertation includes a comprehensive review of the literature on the CLEP General Examinations and a good description of an exemption program at one institution.

Hefferlin, JB Lon. Avoiding cut-rate credits and discount degrees, in K. Patricia Cross, John R. Valley, and Associates, *Planning non-traditional programs: An analysis of the issues for postsecondary education.* San Francisco: Jossey-Bass, 1974, pp. 148-174.

The need for quality control, according to Hefferlin, has more long-term significance than any other issue in the development of nontraditional study. As long as an academic degree "signified not only a certain competence, but also a certain amount of chair-sitting, it was relatively easy to identify fraud." But with the growth of diversity and innovations such as the external degree, the line between legitimate and fraudulent degree programs has become more and more difficult to distinguish. This chapter deals with two mechanisms for quality control: (1) government support and regulation of educational institutions and (2) accreditation by recognized agencies.

Hills, John R. Use of measurement in selection and placement, in Robert L. Thorndike (Ed.), *Educational measurement* (2nd ed.) Washington, D.C.: American Council on Education, 1971, pp. 680-732.

Hills presents an extensive theoretical treatment of placement problems.

His approach follows Cronbach and involves decision theory, the concept of utility, and the fundamental idea that different students can be taught most effectively through different methods. According to the author, placement refers to "the assignment of personnel to different treatments along a single dimension when there is only a single predictor dimension," and placement may include selection if one of the placement possibilities is rejection. He discusses current placement procedures and their effectiveness, making ample reference to research literature. He also describes several different types of aptitude-treatment interactions and problems in their use. The chapter is an important technical reference to which this report is partly indebted.

Holtzman, Wayne H. (Ed.) *Computer-assisted instruction, testing, and guidance.* New York: Harper & Row, 1970, 402 pp.

The papers compiled in this book were presented at a 1968 conference at the University of Texas in Austin organized by the Social Science Research Council and the College Board. They cover various aspects of the application of computer technology to education; for example, system and instructional design, optimizing learning, individually tailored testing, language processing, and guidance and counseling. The authors represent diverse interests and viewpoints. Although some of the chapters are quite technical, the general discussions of issues and concerns are informative and important.

Houle, Cyril O. *The external degree.* San Francisco: Jossey-Bass, 1973, 214 pp.

When the Commission on Non-Traditional Study came to write its final report, the members decided that the external degree was so important a topic that it warranted separate treatment. This book, therefore, complements *Diversity by Design*, the formal report of the commission. Houle examines the external degree in relation to historical perspective, foreign programs, rationale, institutional issues, and problems of general policy. Summerskill's "Epilogue" describes the current status of external degree programs, which he sees as having four thrusts: different curriculum, new student populations, new kinds of faculty, or a new arrangement of space and time requirements. Houle concludes the book with an especially useful bibliographic essay.

Keller, Fred S. "Good-bye, teacher . . ." *Journal of Applied Behavior Analysis*, 1968, vol. 1, no. 1, pp. 79-89.

Over a period of years, Keller developed a successful introductory psychology course taught by an unconventional method. It has since become a well-known and widely copied model for adapting instruction to individual needs within a group framework. The differentiated teaching staff in this course consists of the instructor, graduate assistants, and undergraduate proctors. The course materials include a standard textbook, some programmed materials, study questions (homework assignments), and laboratory exercises. The work is divided into units, which the student completes at his own pace. After each unit he takes a test, which is immediately corrected by and discussed with a proctor. Each test can be taken as many times as necessary until the material is mastered. Lectures and demonstrations are not required but are offered for motivational purposes at various times when a number of students have reached the appropriate point in the course.

One might erroneously infer from the title of this article that Keller advocates replacing the teacher entirely. Although he does not object to use of computers, teaching machines, television, etc., as supplements, human contact remains central to his program. He is really saying good-bye to the traditional role of the teacher. He sees the instructor becoming a "facilitator of learning" rather than a lecturer or discussion leader. The student has frequent contact with his proctor and the assistants and occasional contact with the instructor, who provides optional demonstrations, lectures, and discussions.

Kimmel, Ernest W. Problems of recognition, in Samuel B. Gould and K. Patricia Cross (Eds.), *Explorations in non-traditional study*. San Francisco: Jossey-Bass, 1972, pp. 64-94.

Kimmel discusses recognition of college-level academic achievement and compares means of evaluating traditional and nontraditional learning. Evaluation of achievement is defined as the "processes used to determine the level of knowledge or understanding that has been achieved," while recognition consists of "the limited set of symbols that formally represent the level of academic accomplishment . . . [e.g.] grades, advanced placement, credit hours, certificates, and degrees." Many types of learning, regardless of when or how acquired, can be evaluated and recognized by examination, and the author reviews several examination programs that are used for exemption purposes. He also discusses other new and proposed means of recognizing nontraditional learning, such as regional examining universities and the granting of external degrees.

Kintzer, Frederick C. *Middleman in higher education: Improving articulation among high school, community college, and senior institutions*. San Francisco: Jossey-Bass, 1973, 188 pp.

Transfer articulation – providing for the smooth flow of students from school to school – is the subject of this book. Following a chapter on history and background, Kintzer describes and evaluates several articulation models including formal and legal policies, state system policies, and voluntary agreements among institutions. The "middleman" of the title is the community college, which must handle articulation problems with both the high school and the four-year college or university. A useful feature of the book is a summary of articulation policies by state.

Knoell, Dorothy M., and Medsker, Leland L. *From junior to senior college: A national study of the transfer student.* Washington, D.C.: American Council on Education, 1965, 102 pp.

In the early 1960s Knoell and Medsker completed an extensive, nationwide study of articulation between two- and four-year colleges and the performance of transfer students. This report summarizes their investigations and constitutes the classic reference on transfer to the upper division. The authors stress the need for statewide articulation mechanisms, which are essential for the successful operation of hierarchical systems of higher education.

As a result of this report, a national Joint Committee on Junior and Senior Colleges was formed, and it produced the important *Guidelines for Improving Articulation between Junior and Senior Colleges*, published in 1966 by the American Council on Education.

Kreplin, Hannah. *Credit by examination: A review and analysis of the literature.* Berkeley, Calif.: University of California, 1971, 86 pp. (Available from ERIC, ED 064 616)

Kreplin provides a useful historical reference on the American credit-hour system and credit by examination. She covers such topics as types, uses, and consequences of credit by examination; program descriptions; appropriateness of various subject-matter areas to credit by examination; attitudes of faculty, students, administrators, and organizations; costs and benefits; and examination design and administration. A lengthy bibliography is included. The report is uneven and not especially well organized, but it contains some insightful discussion of the educational context in which credit by examination operates.

Kulik, James A., Kulik, Chen-Lin, and Carmichael, Kevin. The Keller plan in science teaching. *Science*, 1974, vol. 183, no. 4123, pp. 379-383.

The Keller plan is an instructional method that involves individual pacing, student tutoring, and mastery learning. (See annotation of Keller's "Good-bye, Teacher.") According to the authors, a literature review revealed that over a thousand college-level science courses are now being taught with some variation of this plan. Research strongly indicates that students prefer this instructional method to lectures, perform in it as well as or better than in conventional courses, and work harder; that the most popular features of the plan are self-pacing and interacting with tutors; and that high withdrawal rates common in these courses can be controlled through course design.

Lindvall, C. M., Cox, Richard C., and Bolvin, John O. *Evaluation as a tool in curriculum development: The IPI evaluation program.* Chicago: Rand McNally, 1970, 115 pp.

The Individually Prescribed Instruction (IPI) program, a self-instructional curriculum at the elementary level, was developed at the Learning Research and Development Center of the University of Pittsburgh. It utilizes three types of evaluation. The first is the regular and systematic monitoring of individual pupil achievement for the purpose of adapting instruction to individual needs. Second, formative evaluation is a continuing process that aids in the development of the program. Finally, summative evaluation is used to judge the results of the program in order to determine its effectiveness and value. A major component of IPI is a testing program that determines where the pupil should begin the program and assesses his progress at each step along the way.

Losak, John. Do remedial programs really work? *Personnel and Guidance Journal*, 1972b, vol. 50, no. 5, pp. 383-386.

In an all too rare experimental study, Miami-Dade Junior College examined the notion that remedial courses improve academic skills more than ordinary college-level courses do. Entering freshmen who scored below a certain point on the School and College Ability Test were randomly placed in either a remedial reading-writing course or a regular college-level English course. Results showed the following. (1) Although the GPAs of the experimental group were significantly higher ($p<.001$) than those of the control group at the end of the fall term (when students were taking remedial work), the difference did not hold in the second semester. (2) On the standardized reading test administered at the end of the fall term both groups improved, but there was no difference between the two groups. (3) After the first semester the attrition rate was the same for both groups, but after the second semester a significantly greater percentage of the control group's students withdrew. (4) In subsequent courses there was no significant difference in the performance of the two groups.

The author concludes that the remedial program at Miami-Dade is not providing the underprepared student with any benefits he would not derive from the regular English course. There are, of course, exceptions to the rule, and Losak points out that the error is in treating all students with low aptitude test scores as a homogeneous group. He recommends differential diagnosis of student characteristics and alternate educational treatments.

Majasan, Joseph Kolawole. *College students' achievement as a function of the congruence between their beliefs and their instructor's beliefs.* Ph.D. Dissertation, School of Education, Stanford University, 1972.

The instructors and students in 12 classes of introductory psychology at five different institutions completed a questionnaire on beliefs in psychology that ranged from behaviorist to phenomenologist/humanist. The investigator hypothesized that the students whose beliefs were close to those of their instructor would perform better in the course than students whose beliefs differed from the instructor's. The hypothesis was substantiated; when achievement was controlled for ability, the students whose positions on the belief scale were most similar to those of their instructor had the highest achievement scores. The more dissimilar the student's attitude was from that of his instructor (in either direction), the lower was his achievement. This study is a striking example of how "cognitive compatibility" (belief congruency) can affect student achievement.

McKeachie, Wilbert J. Research on teaching at the college and university level, in N. L. Gage (Ed.), *Handbook of research on teaching*. Chicago: Rand McNally, 1963, pp. 1118-1172.

The major portion of this chapter is devoted to a comprehensive review of the literature on college teaching methods. The author also discusses learning principles relevant to teaching, methodological research problems, and consideration of individual differences in evaluating teaching methods. He points out that one reason research has failed to demonstrate significant differences in the effectiveness of various teaching methods may be that different methods are better for different students. When comparisons are made on the basis of mean scores, such differences are obscured. According to McKeachie, although no one method has been shown to be best, research does suggest that instructional methods have important consequences in terms of "differential achievement of the differing objectives of a course, differential effects upon different types of students, and probable differential effects depending upon other factors such as the instructor, the course content, and the overall 'climate' of the institution."

McKeachie, Wilbert J. *Teaching tips: A guidebook for the beginning college teacher*. Lexington, Mass.: D. C. Heath, 1969, 280 pp.

This is the sixth edition of a useful guidebook for the inexperienced college instructor. It consists of practical suggestions for coping with immediate classroom problems as well as discussion of relevant research. The author calls it "a compilation of useful (occasionally mechanical) tricks of the trade." He takes the reader step by step from preparing for a course and meeting a class for the first time to examinations, grading, and counseling. He also discusses doing and evaluating research on teaching, student ratings of faculty, and faculty attitudes and teaching effectiveness.

Moore, William, Jr. *Against the odds: The high risk student in the community college*. San Francisco: Jossey-Bass, 1970, 244 pp.

This useful book is the best reference available on compensatory programming. It describes in no uncertain terms the plight of the low achieving or marginal student—his frustration with poor instruction and counseling, his humiliation due to failure that is not his fault, and the lack of commitment on the part of his instructors. Moore not only criticizes the present state of affairs but also makes specific suggestions for constructive change. He discusses such subjects as teaching methods, teacher attitudes, the roles of counselor and administrator, and curriculum. He describes in detail the General Curriculum, a comprehensive compensatory program at Forest Park Community College in St. Louis.

The General Curriculum consists of three parts: basic academic skills, which are taught through programmed materials; personal enrichment, which is achieved through general education classes; and adjustment to self and society, which is accomplished through guidance and counseling. The basic skills are taught by a systems approach that involves identification, diagnosis, remediation, and follow-through. The goal of the program for the student is to place him in another curriculum in the college, a training program located elsewhere, or a new or upgraded job.

National Education Association, Research Division. *Ability grouping*. Research Summary 1968-S3. Washington, D.C.: NEA, 1968, 52 pp.

This extensive review covers school organization, grouping practices, and advantages and disadvantages of ability grouping. A lengthy chapter is devoted to a review of 50 selected studies on the effects of ability grouping. Although considerable research has been done on this question, the results are reported to be inconclusive. Although many variables are present in most ability-grouping situations, few of the studies reviewed used a multivariable approach or controlled procedures.

There is great diversity in the practice of ability grouping as well as in opinions about its value. But the report suggests three general areas of agreement: (1) "Ability grouping has yet to prove itself as an administrative device to meet both effectively and efficiently the individual needs of all pupils in most areas of educational concern." (2) More and better research is needed. (3) There is no point in grouping students unless the different groups are provided with different curriculums, materials, and teaching methods.

Page, Ellis Batten. Teacher comments and student performance: A seventy-four classroom experiment in school motivation. *Journal of Educational Psychology*, 1958, vol. 49, no. 4, pp. 173-181.

The purpose of this study was to ascertain the effect of teacher comments on student performance. Seventy-four randomly selected teachers of grades 7-12 administered objective tests to their classes. The tests were corrected, and the students in each class were matched according to their scores and divided into three groups: a Free Comment group received whatever comments the teacher felt appropriate, a Specified Comment group received encouraging remarks determined in advance by the experimenter, and a third group received no comments. The performance of the three groups was compared on the next objective test.

Students in the Free Comment group performed better than those in the Specified Comment group, and Specified Comment students scored higher than those in the no comment group. This difference held across schools and across grades. The teachers' belief that good students were more responsive to comments than poor students was not substantiated. In fact, it was mainly the students with the lowest grades on the first test whose performance improved after receiving encouraging comments. This imaginative study illustrates how differential treatments can be employed within a single class.

Politzer, Robert L. Toward individualization in foreign language teaching. *Modern Language Journal*, 1971, vol. 55, no. 4, pp. 207-212.

As foreign-language requirements continue to be abandoned by colleges and universities and foreign-language enrollments continue to drop, Politzer sees individualization of goals, methods, and pacing of language instruction becoming a necessity. The importance of articulating foreign-language curriculum units has always been acknowledged, but since students learn at different rates, "real articulation presupposes individualization." In order to be useful, the concept of curriculum "level" must be understood as a level of student achievement rather than an amount of material covered by the teacher.

Several trends have contributed to the renewed interest in individualization in foreign-language education: (1) reaction against the rigid Skinnerian audiolingual approach dominant in the 1960s, which ignored individual aptitude differences, (2) new emphasis on learning as opposed to teaching, (3) recognition of the significance of aptitude-treatment interactions, (4) technological advances, and (5) flexible scheduling. This article is a good illustration of the fact that individualization is more advanced in foreign-language instruction than perhaps any other discipline.

Roueche, John E. *Salvage, redirection, or custody? Remedial education in the community junior college.* Washington, D.C.: American Association of Junior Colleges, 1968, 67 pp.

This monograph is one of a series prepared by the staff of the ERIC Clearinghouse for Junior College Information. It presents a comprehensive, critical review of the research on two-year college remedial education and documents the fact that traditional approaches have not succeeded in educating underprepared students. Remedial education, according to Roueche, implies an effort to eliminate deficiencies so that a student can enter a course or program for which he was previously ineligible. Remedial education is a major responsibility of the community college in seeking to implement the "open door." Since research suggests that current programs are not successful, the author recommends development of new approaches toward identification and description of the student requiring remedial education, use of different kinds of tests and instruments and development and evaluation of new remedial curriculums and instructional procedures.

Roueche, John E., and Kirk, R. Wade. *Catching up: Remedial education.* San Francisco: Jossey-Bass, 1973, 106 pp.

This book is useful because it identifies five prominent junior college programs for high-risk students, describes their basic character, and makes a number of helpful suggestions regarding beneficial characteristics of compensatory programs. Components of a successful program are identified as (1) instructors who are in the program voluntarily and are committed to helping students be successful; (2) instruction by a variety of methods other than lecture, e.g., tutoring and programmed learning; (3) focus on self-concept development; (4) positive program image; (5) adequate counseling; and (6) institutional commitment.

Ruyle, Janet, and Geiselman, Lucy Ann. Non-traditional opportunities and programs, in K. Patricia Cross, John R. Valley, and Associates, *Planning non-traditional programs: An analysis of the issues for postsecondary education.* San Francisco: Jossey-Bass, 1974, pp. 53-94.

As part of the research program for the Commission on Non-Traditional Study, this useful survey of colleges and universities gathered facts about nontraditional programs and opportunities for nontraditional study. A nontraditional program is defined as a specially designed program "based on new or unconventional forms of education free of the time or place limitations of traditional classroom instruction." The investigators found that in 1972 between a fourth and a third of American colleges were offering such programs, as many as 1,000 to 1,400 were in operation, and between 125,000 and 240,000 students were enrolled in them.

Salomon, Gavriel. Heuristic models for the generation of aptitude-treatment interaction hypotheses. *Review of Educational Research,* 1972, vol. 42, no. 3, pp. 327-343.

One of the problems with research on aptitude-treatment interactions is the lack of an explanatory conceptual scheme. When an interaction is found, there is very little in the way of rationale to explain what causes a given treatment to be more effective for one group than for another. Salomon presents three models of aptitude-treatment interaction in the hope of drawing attention to the explanatory potential of such models.

The remedial approach is the most familiar – it involves the assumption that "some critical ingredient of knowledge is deficient or missing," and the treatment is designed to correct the deficiency. In the compensatory model, treatments are designed to circumvent a deficiency without trying to do away with it. The remedial model is appropriate for highly task-specific capabilities, while in the compensatory model the aptitudes (traits) are of a more general nature. The third model is called "preferential" because it is based on an individual's strengths rather than his weaknesses. It capitalizes on his preferred style or information-processing strategy and is appropriate where the learner is low in one relevant aptitude and high in another.

Sharon, Amiel T. *College credit for off-campus study.* Report 8. Washington, D.C.: ERIC Clearinghouse on Higher Education, 1971, 15 pp.

This literature review covers several areas of nontraditional study (educational television, correspondence study, military courses, and independent study) and the various ways off-campus learning is translated into college credit. The author describes the major programs of credit by examination and discusses what he calls their logical extension – the external degree.

Skinner, B. F. The science of learning and the art of teaching, *Harvard Educational Review*, 1954, vol. 24, no. 2, pp. 86-97.

In this influential article, Skinner discusses advances in the science of learning and their potential applications in the classroom. By analyzing the effects of reinforcement and by designing techniques that manipulate reinforcement with great precision, psychologists have been able to shape and maintain very complex behavior. In the traditional school, however, this capability is not utilized.

The process of attaining competence in any field must be divided into a very large number of very small steps, and the accomplishment of each step must be reinforced. With traditional instructional methods this is hardly possible. In the first place, classroom control is aversive – children work primarily to avoid such negative events as teacher criticism or low marks, and getting an answer right is in itself insignificant. Secondly, there is too great a delay between response and reinforcement – for example, the teacher often has to take papers home for correction. A third problem is that the teacher cannot deal with responses one at a time, and reinforcement is far too infrequent. The result of these problems is that children learn drill subjects like arithmetic neither quickly nor well.

Skinner argued that this situation could be corrected with the aid of a mechanical device that (1) provides immediate reinforcement for each right answer, (2) allows each pupil to proceed at his own pace, (3) utilizes materials carefully designed so that each problem depends on the answer to the one before, and (4) frees teachers from the mechanical task of marking answers right or wrong, thus allowing them to spend time on those intellectual, cultural, and emotional activities that cannot be duplicated by a machine. These points of view had great salience in education for a decade or more. Some critics feel that Skinner greatly overemphasized the importance of reinforcement. In any event programmed materials and computer-assisted instruction have largely replaced the relatively inflexible teaching machine.

Snow, Richard E. *Personal/intellectual differences and new forms of education: Aptitude-treatment interactions and individualized alternatives in higher education*. Paper presented to the Graduate Records Examination Board Invitational Conference on Cognitive Styles and Creativity in Higher Education, Montreal, Canada, November 10, 1972, 27 pp. Available from the author, School of Education, Stanford University, Stanford, Calif.

Snow gives an excellent explanation of the rationale for studying aptitude-treatment interactions (ATIs), reviews some relevant research results, and discusses the need for a new method of generating research hypotheses. The purpose of studying ATIs is to find the best method or environment for each individual. The traditional experimental approach to problems of classification or selection is inappropriate in this context because it seeks a best overall treatment, which means looking at average outcomes and obscuring differences in how good a given treatment may be for an individual or a subgroup. The traditional correlational approach is inappropriate because it seeks general predictors and ignores treatment variations.

Although Snow feels that the possibilities of finding ATIs are much greater now than he believed a few years ago, he points out that most research, even on new forms of education, has continued to look at averages and thus found no significant differences between methods. He discusses possibilities for future ATI research and presents a set of heuristic devices that can be used to generate ATI hypotheses.

Stallings, William M., Aleamoni, Lawrence M., and Heil, D. K. The University of Illinois placement and proficiency system: Description and results. *Journal of Higher Education*, 1972, vol. 43, no. 8, pp. 610-619.

This article provides a useful description of a placement/exemption/credit program at a single institution. The University of Illinois uses locally developed departmental tests as well as external examinations, such as the College Board Advanced Placement Examinations, which are locally normed and validated each year. The authors estimate that a credit earned by examination costs the university about $7, while the instructional cost per credit hour for lower division undergraduate courses is about $15.

Sweet, Phyllis R., and Nuttall, Ronald L. The effects of a tracking system on student satisfaction and achievement. *American Educational Research Journal*, 1971, vol. 8, no. 3, pp. 511-520.

The purpose of this study was to determine the effectiveness of a homogeneous grouping system as indicated by student attitude and English grade-point average. The subjects were 386 high school freshmen; sex and English ability group were independent variables. For each school subject, students were placed in one of four tracks – advanced placement, honors, standard, or basic – on the basis of various test scores and the eighth-grade subject teacher's grade. The investigators developed a questionnaire to measure attitude toward placement.

Results showed that only the students in the standard track were satisfied with the system; those in the lower and higher groups had negative attitudes. Girls had strong feelings against the system, and the boys' attitudes were mildly favorable. English grades were not related to either sex or track. The study is interesting because it illustrates appropriate use of a satisfaction criterion and inappropriate use of a class grade criterion across classes that differ in objectives and content.

Trent, James W., and Cohen, Arthur M. Research on teaching in higher education, in Robert M. W. Travers (Ed.), *Second handbook of research on teaching*. Chicago: Rand McNally, 1973, pp. 997-1071.

This report updates McKeachie's chapter in the first *Handbook of Research on Teaching* published a decade earlier. It reviews the literature of the 1960s when according to the authors, the form and content of college instruction changed considerably as a result of technology and student dissidence. The research of the decade reflected this change, and many of the studies reviewed concerned effects of different instructional media on the one hand and student and faculty militancy on the other. The review is organized under five main headings: (1) teaching environments; (2) student characteristics and the learning process; (3) teaching technology and methods; (4) teaching recruitment, training, and resources; and (5) evaluation of teaching.

In a closing section the authors conclude that the research of the decade was disappointing – it succeeded in challenging old assumptions but not in establishing new generalizations, it lacked critical appraisal, and its effect on higher education was questionable. They recommend more comprehensive and sophisticated research, more evaluation based on the research, and better dissemination and more institutional application of the results.

Valley, John R. *Increasing the options: Recent developments in college and university degree programs*. Princeton, N.J.: Educational Testing Service, 1972, 56 pp.

This report contains descriptions of exemplary nontraditional degree programs developed since 1969. It is divided into sections on (1) new programs, (2) proposals, (3) major studies, investigations, and reports, and (4) related and supporting services. Each section begins with a two-way table classifying programs by geographical location and important features (e.g., credit by examination, off-campus setting, credit for work/experience). The report intentionally excludes such developments as time-shortened degree programs and curricular reorganization but provides a valuable view of diverse nontraditional programs.

Waits, Bert. Individualized instruction in large enrollment mathematics courses. *American Mathematical Monthly*, March 1973, vol. 80, pp. 307-310.

Ohio State has developed the complex CRIMEL program (Curriculum Revision and Instruction in Mathematics at the Elementary Level) to individualize mathematics instruction for several thousand freshmen. It features self-pacing, varied instructional aids, repeated testing, and a modular syllabus. The program provides one of the best illustrations of mass individualization in higher education. See Chapter 4 of this report.

Wallen, Norman E., and Travers, Robert M. W. Analysis and investigation of teaching methods, in N. L. Gage (Ed.), *Handbook of research on teaching*. Chicago: Rand McNally, 1963, pp. 448-505.

This chapter provides a critical review of the research on teaching methods and a scholarly documentation of the failure of research to demonstrate the superiority of any one method. The authors attribute this failure to the lack of scientific sophistication in the development of and research on teaching methods Most methods, they say, have developed as a result of philosophical or cultural tradition or because of teacher needs or school and community conditions. Most research in this area has been characterized by lack of specificity in describing the conditions to be compared. They recommend that new teaching methods be developed according to a learning model based on the empirical results of psychological research.

Warren, Jonathan R. Awarding credit, in K. Patricia Cross, John R. Valley, and Associates, *Planning non-traditional programs: An analysis of the issues for postsecondary education*. San Francisco: Jossey-Bass, 1974, pp. 116-147.

This chapter provides a very good discussion of the relationship between means of assessment and means of crediting. In the present system, credits are defined by the requirements for a degree, and their basic purpose is to serve as a standard unit through which the comparability of different educational experiences can be determined. This basic purpose leads to others, such as marking student progress, rewarding student performance, selection and certification, and accounting for educational services performed. Nontraditional practices in awarding credit include validation through examination as well as granting credit for correspondence study, work experience (before or during enrollment), study abroad, and community services. The author proposes a system in which credits would be based on competencies attained without regard to length of time spent in an activity or its relation to a 15-week semester. Assessment procedures and criteria would also vary according to the purpose of the learning experience. For example, a student preparing for a career in business might be evaluated differently from a student planning to study law or pursue graduate studies in political science—on a different set of criteria and by different procedures.

White, Edward M. *Equivalency testing in college freshman English: A report and a proposal*. English Council, California State University and Colleges, October 1972, 26 pp.

When the California State Colleges began to use the examinations of the College-Level Examination Program to exempt entering students from freshman English, the State College English Council became concerned and set out to investigate equivalency testing in English. This worthwhile report is one result of that study. Although it does not claim to be exhaustive, it does recommend a specific program of English equivalency testing that combines objective and essay questions. The report analyzes the strengths and weaknesses of both types of questions and concludes that a good test of writing ability must include both. An appendix of estimated expenses of essay reading is included.

Willingham, Warren W. *The no. 2 access problem: Transfer to the upper division*. ERIC-AAHE Report 4. Washington, D.C.: American Association for Higher Education, 1972, 60 pp.

This monograph discusses the problems of transferring from two-year to four-year colleges. The author reviewed the literature published since the classic Knoell-Medsker study of the early 1960s and found that surprisingly little research had been published in this area considering the growth of two-year colleges, the vast numbers of students transferring each year, and the importance of articulation to the smooth operation of hierarchical systems of higher education. A structured telephone survey was conducted to supplement the literature review with more current, firsthand information about transfer policies and procedures. Ten problem areas were identified and discussed: curriculum articulation, adequate guidance at the community college, adequate orientation at the senior college, diverse admission procedures, diverse academic standards, credit, access/retention, need for financial aid, need for space, and articulation procedures.

Witkin, Herman A., and Moore, Carol Ann. *Cognitive style and the teaching-learning process.* Paper presented at the annual meeting of the American Educational Research Association, Chicago, April 1974, 23 pp.

The authors discuss the educational implications of cognitive styles displayed by students and teachers. In particular they consider the personal characteristics of the cognitive style known as the "field-dependence-independence dimension." Cognitive style refers to "self-consistency in an individual's way of handling a wide range of perceptual and intellectual tasks." Field-dependence-independence has to do with global versus analytical perception and social sensitivity versus interest in more impersonal, abstract aspects of the environment.

The interaction of teacher and student cognitive styles clearly affects the way students learn and is particularly relevant to Model 2 (matching students and teachers) of this report. Witkin and Moore feel that too little is known at this point to decide whether match in cognitive style should be used in setting up classes. They recommend further cognitive-style research based on an aptitude-treatment interaction approach.

Wittrock, M. C., and Wiley, David E. (Eds.) *The evaluation of instruction: Issues and problems.* New York: Holt, Rinehart and Winston, 1970, 494 pp.

An excellent symposium was sponsored in 1967 by the University of California at Los Angeles Research and Development Center for the Study of Evaluation, and the Ford Foundation's Fund for the Advancement of Education. This book contains the proceedings. The papers were intended to produce "new conceptual and research approaches to evaluation" that would contribute to knowledge about instruction and learning. The authors include such well-known figures as Benjamin Bloom, Robert Glaser, Robert Gagné, and Samuel Messick. Topics covered were theory of evaluation, instructional variables, contextual variables, criteria of instruction, and methodology.

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